OPERATIONAL REQUIREMENTS DOCUMENT (ORD)

AC2ISRC (USAF) 001-99 I/II
For
ADVANCED REMOTE GROUND UNATTENDED SENSOR (ARGUS)

ACAT Level III

Prepared for Milestone II Decision

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1.0 GENERAL DESCRIPTION OF OPERATIONAL CAPABILITY. The genesis for the Advanced Remote Ground Unattended Sensor (ARGUS) program was the Defense Intelligence Agency (DIA) Central MASINT Organization (CMO) Unattended Measurement and Signature Intelligence (MASINT) Sensor (UMS) program. It began in late 1992 with a mission need statement (MNS) drafted jointly by the United States Central Command (USCENTCOM) and United States Special Operations Command (USSOCOM). In July 1994, the CMO sponsored the UMS project with Sandia National Laboratories as principal developer. The military utility of the UMS system was highlighted during exercise Roving Sands 97 and led to the FY98-99 unattended ground sensor (UGS) Advanced Concept Technology Demonstration (ACTD). To provide an operational perspective, USCENTCOM and USSOCOM agreed to serve as sponsors and program evaluators. From that time, the UMS concept was successfully validated through a series of field tests that demonstrated the unique capabilities of the system and showcased its value as part of a theater's command and control, intelligence, surveillance, and reconnaissance (C2ISR) architecture. The results of the successful ACTD were briefed to the Deputy Undersecretary of Defense (DUSD) for Advanced Systems and Concepts (AS&C) in September 1999. The formal military utility assessment was signed in January 00 by Commander in Chief (CINC), USCENTCOM. Both the user sponsors and the DUSD agreed that the ACTD was a successful step towards rapidly transitioning these systems to acquisition and operational use.

1.1. Mission Area. The ARGUS provides another option for the defeat of theater Time Critical Targets (TCT). This capability complements and enhances other Intelligence Surveillance and Reconnaissance (ISR) assets tasked to support attack operations against mobile theater threats**.** Future ARGUS sensor packages will apply to both National

Missile Defense and Theater Missile Defense, as well as the broader targeting problem which addresses the growing proliferation of land, air, maritime, and space TCTs found in all geographic areas of the globe. ARGUS will be a force multiplier by finding, fixing, tracking, and targeting (identifying) Joint Forces Commander (JFC)-designated TCTs and, in certain instances, their infrastructure so that other ISR assets can then be re-tasked (if desired) in response to the ARGUS data. TCTs rank high on the Joint Integrated Prioritized Target List (JIPTL) as documented in AC2ISRC (USAF) 401-98, Family of Systems Requirements Document (FSRD) "Defeating Theater Time Critical Targets." Prosecuting these targets requires precise synchronization of operations through rapid exchange of accurate information between ISR, command and control (C2), and strike systems. Continuing advancement and proliferation of mobile TCTs means the threat cannot currently be countered by any one single technical solution. In many instances, ARGUS will provide the initial detection and also perform second phase target verification towards successfully prosecuting a TCT. This document also delineates how ARGUS can leverage other ISR assets, as well as other Services, allies and coalition partners, to defeat TCTs.

1.1.1 Mission Need. This document responds to the requirements specified in the 2000-2005 Defense Planning Guidance and supports the Office of the Under Secretary of Defense, Acquisition & Technology (OUSDAT) Mission Area #110 Strategic Offense; #113, Airborne Strike; #221, Counter Air; #223, Close Air Support and Interdiction; #224, Defense Suppression; #225, Air Warfare Support; #307, Special Operations Forces; #321, Tactical Intelligence and Related Activities for Strategic Warfare; # 323, Tactical Intelligence and Related Activities for Land Warfare; # 327, Tactical Intelligence and Related Activities for Tactical Air Warfare; #373, Tactical Surveillance, Reconnaissance and Target Acquisition.

1.2 Description of the Proposed System.

The ARGUS system design, based on the afore-mentioned, successful ACTD, includes the deployable unit and the support infrastructure. The deployable unit is currently comprised of a sensor suite, sensor signal processor, communications transceiver, storage

device, Global Positioning System, and battery power supply. The associated infrastructure includes, but is not limited to, intelligence preparation of the battlefield (IPB) tools, satellite communications and associated ground stations used to transmit and receive data. The ARGUS system must be of modular design, with an open architecture, and be capable of integrating new hardware and software capabilities, as they become available. An ARGUS unit must consist of as a minimum, sensors, sensor signal processor, communications transceiver, storage device, and power supply. Additionally, the ARGUS infrastructure must include a sensor interface, communications interface, mission planning tools, and pre-deployment programming and testing equipment. The ARGUS unit must be capable of detecting, identifying, and locating targets in near real time, using multiple and interchangeable sensor modules. Sensor module options will initially include seismic and acoustic capabilities, but eventually could also include hydroacoustic, infrared (IR), magnetic, thermal, radio frequency (RF), radiation, materials/effluent and debris sampling, laser, synthetic aperture and/or millimeter wave radar, spectro-radiometric, optical, electronic resonance, chemical, and biological sensors. This is not to infer that addition capabilities will not be added as they become avaialable. Environmental sensor options need to include, but not be limited to modules to measure wind speed and direction, humidity, barometric pressure, and temperature. An ARGUS unit must be capable of various delivery options to include hand emplaced and airdropped. The hand emplaced unit must be small and lightweight and able to be carried by one person. The airdrop unit must be capable of being employed from aircraft including but not limited to high performance jet aircraft, transport aircraft, unmanned aerial vehicles (UAV) and helicopters. Finally, an ARGUS unit must have a low cost of production because once employed they will not normally be retrieved for refurbishing for reuse. Deployed ARGUS sensors must be designed to incorporate low probability of detection/interception (LPI/LPD) communications capabilities.

1.3 Operational Concepts of Employment. ARGUS will autonomously provide joint forces and other commanders with MASINT-derived information for enhanced situational awareness, threat warning and targeting information on time critical targets and other mobile enemy systems. Detected target reports, meeting pre-established

reporting criteria, will be burst transmitted via long-haul communications to a designated, theater information broadcast dissemination system site (e.g., TIBS, IBS, or GCCS, etc.) for review to ensure it meets pre-established reporting criteria. This process, from target resolution/identification to receipt of data by the end user, must be done in near real time (under five minutes). It will also provide the capability to cue wide area sensors on ISR platforms such as the JSTARS or U-2R. Additionally, ARGUS reports will provide battle managers "tip-off" information for other ISR platforms such as AWACS, E-2C, or the RIVET JOINT about emerging threat situations in their area of interest. Attachment 1 shows the envisioned High-level Operational Concept Graphic (OV-1). ARGUS will also corroborate or confirm in near real time, mobile, time critical targets detected by other ISR platforms. ARGUS must be designed for deployment throughout the battlespace. Although its primary use will be to prosecute potential time critical targets deep within adversary controlled areas, it can also be used within friendly areas to support force protection initiatives. The operational air element must be able to configure the ARGUS during mission preparation with the necessary modular hardware and software components to support the mission. The ARGUS will be capable of deployment by hand, aircraft, or UAV, based on mission planning and the JFC's requirements. When employed, the ARGUS must continuously monitor the area of interest for a period of 180 days, as a minimum, for specific predetermined, high value target signatures. To ensure the ARGUS is responsive to a changing tactical and threat environment it must eventually have the capability to be queried for information at anytime and be capable of reconfiguration with new signature parameters and/or reporting thresholds. The system must also be designed to be used in world-wide geographic and climatic regions, to include desert, jungle, arctic, and temperate areas. The system must be also designed to operate day or night in a wide range of meteorological conditions including rain, snow, fog, and high winds, or from man-made attempts at concealment such as smoke.

1.4 (U) Support Concept. ARGUS units must be supported by organizational and depot level maintenance. The Combat Air Forces (CAF) or the designated support contractor will establish voice and fax hot lines to a “Help Desk” that will provide operator and/or maintenance support to all Expeditionary Air Force (EAF) contingents on

a 24-hour-a-day, seven-days-a-week basis. It will be the responsibility of the help desk to assist CAF personnel in resolving operational and maintenance problems and in tracking the performance characteristics of all fielded systems. The help desk will also provide information on where to send all defective Line Replaceable Units (LRUs) for repair and will direct the shipment of replenishment LRUs to the site. The defective system or system components will be returned to the depot for those faults that cannot be repaired using organizational/operator level maintenance procedures. Shipment to/from the depot will be accomplished using the best commercial and/or government practices utilizing reusable containers to as great an extent possible. New/repaired components sent/returned from depot will be easily and quickly installed and with as short a down time of equipment as possible. Maintenance will be conducted in such a manner as to avoid interruption of combat operations to the greatest extent possible. Deployable systems will require sufficient spares for 30 days without the need for re-supply based on EAF doctrinal requirements. Deployed sensors must be designed for maximum reliability since there will be no maintenance support. Although expendable in nature, if systems are retrieved they will be returned to a qualified location for refurbishment. Calibration and Preventive Maintenance Inspections (PMI) of sensors will be done in accordance with procedures identified by equipment manufacturer to ensure reliability of data. Calibration unable to be accomplished via built in test (BIT) will be sent to a qualified location for proper measurement and certification to ensure equipment performance. System design(s) should allow for ease of maintenance and servicing with minimum personnel, materiel, parts, and special tools and equipment. Procedures for each level of maintenance must be based on the appropriate repair analysis. The performing maintenance activity will report maintenance data monthly using the AF standard maintenance reporting procedures (Core Automated Maintenance System [CAMS]/ Reliability and Maintainability Information System [REMIS] or follow on Integrated Maintenance Data System [IMDS]).

1.5 (U) Summary of Mission Need. There is an immediate need for a ground-based, remotely monitored surveillance system with the capability to find, fix, track, and identify (target) (F2T2) targets throughout denied areas of the battlespace. This requirement warranted an Advanced Concept Technology Demonstration (ACTD) to accelerate the acquisition process. The resulting Unattended Ground Sensor (UGS) ACTD successfully demonstrated the military utility and established the baseline requirements outlined in this ORD. The stated critical Intelligence, Surveillance, and Reconnaissance (ISR) deficiency is to specifically identify (target) time critical and/or high value targets as designated by the Joint Forces Commander (JFC). These targets would likely include: weapons of mass destruction (WMD), their delivery systems and associated support infrastructures, mobile surface-to-air missiles, mobile C2 facilities, and armored forces. Additionally, there is a need to fill existing ISR collection gaps to support IPB by identifying routes of travel, force composition, areas of high and low activity, presence of aircraft and helicopters, activity at dispersed airfields, and activity in underground facilities. Satisfying these needs requires an enhanced capability to rapidly (near-real time), find, fix, track and target targets, and then either handoff to other ISR collection assets for continued monitoring/collection, or to a shooter for attack.

1.6 (U) Performance Parameter Identification. Threshold and objective requirements are specifically identified within the body of the ORD. The terms ***Threshold*** and ***Objective*** are in bold type and immediately follow the stated requirement. Where both apply they are included in the same requirement. In situations where the described requirement is related to a specific delivery chassis, the delivery chassis is specified in parentheses. Additional information (sometimes stated in directive terms) is considered amplifying data. All requirements that are designated ***key performance parameters*** **(KPP)** follow the requirement to which they refer.

2.0 (U) Threat.

2.1 (U) General. ARGUS is primarily designed for employment in denied areas. As a result, the ARGUS is susceptible to the full range of attacks from aircraft, munitions, missiles, conventional ground forces, special operations forces, and terrorists. Additionally, electronic threats such as adversary electronic support (interception, identification, and location), electronic attack (jamming), and other modern information warfare techniques pose a threat to ARGUS.

2.2 (U) Threat to the System. ARGUS sensors and their communications subsystems will be susceptible to a full range of conventional and unconventional attacks from both adversary aircraft and ground forces. The greatest threat to ARGUS (including both the platform and its sensors) will be damage and destruction from conventional ordnance and small arms expended by ground forces or aircraft. Aerial attack munitions could include rockets, unguided bombs and bomblets, guided missiles, precision guided munitions, and cannons. In addition to destruction or damage to the ARGUS itself, its delivery means (aircraft or ground troops) could be engaged by a wide variety of weapons to include lethal air defense systems and ground fire. Susceptibility to various offensive Information Warfare (IW) capabilities, physical tampering or destruction of sensors by ground force personnel (including special ops or terrorists), electronic attack (EA), and destruction by directed energy or nuclear weapons are other potential threats. Environmental/severe weather events such as hail, lightning, floods, hurricanes, and earthquakes may result in damage or destruction of either the platform or its sensors. The ARGUS sensors will have intrusion detection and self-protection capability. Chemical or biological weapons are assessed as presenting little threat to the ARGUS platform or its sensors. Sensors are not expected to survive a lethal weapons attack.

2.2.1 (U) **Information Operations.** Although not likely to be specifically targeted, attacks against ARGUS may start with attempts to find the system. Locational means could include physical discovery by ground forces, electronic detection/location (through signal intercept/identification/ direction finding and location of ARGUS transmissions), and possibly identification/ location with high-resolution imagery.

2.2.2 (U) **Threat Documentation.** Threat descriptions and specific information on the threat environment can be found in the following Threat Environment Description (TED) and System Threat Assessment Report (STAR) documents: Air Combat, NAIC 1574-0730-99 June 99; and the STAR: E-3 Airborne Warning and Control System, NAIC 1574-0728-99 June 99.

3.0 Shortcomings of Existing Systems. No single (or multiple), ground-based operational system currently exists to satisfy the critical requirement that resulted in the successful UGS ACTD. ACTD sponsors recognized that while there are several operational sensor programs in existence, none of them presently have or plan to have in the near future, the necessary capability to satisfy the two most critical requirements ARGUS is expected to satisfy. Specifically, they are: Capability to be air dropped from a high performance aircraft deep inside enemy controlled territory; and then, the ability to find, fix, track, and identify (target) TCTs or other targets from deep within that enemy controlled territory and then transmit that data in near-real time to the JFACC or similar component. Both of these requirements directly support the Air Force's basic concept for Joint Theater Missile Defense, i.e., Attack Operations derived from offensive counterair operations. This was interpreted at the November 1997 Air and Space Conference to mean: "OCA (sic) is parts falling on the enemy's side of the border." This is accomplished by preventing (detecting and killing) launches of TMs against US forces, US allies, and other important countries, including areas of vital interest. This philosophy is consistent with *Air Force Basic Doctrine* contained in Air Force Doctrine Document (AFDD1). In addition, none of the existing sensors or fielded systems have the requisite long haul communications capability or a long duration battery that will enable the system to remain operational for up to six months once deployed. This latter point is critical to safety of the employing force(s) as it will minimize their potential exposure to hostile fire while transiting enemy controlled air space.

4.0 (U) Capabilities Required.

4.1 (U) System Performance. ARGUS will provide a core capability for near real time, surveillance and target identification capability in all types of weather, day and night, in appropriate terrain for finding fixing, tracking, (direction of travel), and specifically identifying (targeting) designated targets. Those designated targets would be in designated areas which would be primarily located, but not limited to, deep in denied areas of the battlespace. ARGUS will be modular, scaleable, miniaturized with minimal power requirements, and be capable of hand or air emplacement. Delivery options could include but not be limited to high performance jet aircraft, UAVs, transport aircraft, and helicopters (to include precision delivery in adverse weather), or hand emplacement.

4.1.1 (U) General Requirements. The ARGUS must be capable of finding, fixing, tracking (direction of travel), identifying (targeting) and reporting via long haul communications on designated target types ***(threshold/objective).*** The deployable sensor units must be able to operate unattended and contain the data collection, correlation, and transmission devices necessary to send information to remote locations using communications satellites or other theater designated transmission mediums ***(threshold/objective).*** The ARGUS visual signature must be designed to incorporate camouflage techniques and be compatible with the geographical environment of the deployed area ***(threshold/ objective).*** The ARGUS may be used separately in a stand-alone mode, or in conjunction with other sensors to assist in correlating information from multiple sensors to increase target identification or locational accuracy. The sensor must be able to go into a standby mode for power conservation until activated by targets or remotely queried for system status ***(threshold/objective***). The user must have the ability to define and remotely add additional targets of interest to the system ***(threshold/ objective)***, using world-wide, two-way communications. The specific requirements for that interface is outlined in paragraph 4.1.4 and in the draft ARGUS Command, Control, Intelligence, Computers, and Intelligence Support Plan (C4ISP). Finally, the ARGUS sensors must also collect and store unknown signatures when queried for post collection processing and analysis (MASINT role) ***(objective).***

4.1.2 (U) Sensors Suite. The initial configuration for the ARGUS unit will have two sensor types (acoustic/seismic) ***(threshold) (objective—five)*** and must be capable of finding, fixing, tracking (direction of travel) and identifying (targeting) specified targets. Sensor detection and identification ranges will vary, based on the characteristics of the target itself and existing environmental conditions. However, the sensors must be capable of finding, fixing, and tracking targets located within 500 meters of the sensor (***threshold) (objective—2,000)*** and identifying within 200 meters ***(threshold) (Key Performance Parameter) (objective—500 meters)*** of the unit, under environmental conditions existing during the ACTD. Probability of detection and classification are listed below for the Acoustic (Table 1) and Seismic (Table 2) sensors. Any degradations in range and accuracy will be consistent with changes in severe atmospheric, meteorological, or geological conditions. The type of sensor required will be based on the development of additional sensor capabilities and tasking authority requirements. Possible additional sensor capabilities will include, but not be limited to: Infrared (IR), magnetic, thermal, radio frequency (RF), radiation, materials/effluent and debris sampling, laser, radar, spectro-radiometric, optical, electronic resonance, chemical/ biological, and environmental sensors. Provisions need to be made for the inclusion of any of these sensor types, as modular subsystems for evolutionary enhancements to the threshold system. Additional sensor performance criteria will be developed based upon the evolution of specific technological capabilities. Finally, the ARGUS must be able to classify local environmental conditions to predict potential Nuclear, Biological, and Chemical (NBC) fallout and direction of travel ***(Objective).***

Table 1: (U) Acoustic Sensor Characteristics

Characteristic	Threshold	Objective
Detection Range	500M	2,000M
Identification Range	200M	500M
Bearing (stationary target)	+/- 10 Degrees	+/- 2 Degrees
Direction of travel	Within 45 degrees	Within 15 degrees
Pd at 500M	.95	.99
Pd at 1,000M	.9	.95
Pd at 2,000M	N/A	.85
Pi at 200M	.95	.99
Pi at 500M	.6	.95
Pi at 1,000M	N/A	.7

Pd = Probability of Detection Pi = Probability of Identification

NOTE: Threshold and objective parameters are based on operating conditions during the ACTD. Ranges for extreme environmental conditions will be adjusted according to additional testing and will be determined at a later date in the acquisition process.

Table 2: (U) Seismic Sensor Characteristics

Characteristic	Threshold	Objective
Detection Range	200M	500M
Characterization Range	N/A	200M
Pd at 100M	.95	.95
Pd at 200M	.8	.9
Pd at 500M	.5	.8
Pc at 100M	N/A	.95
Pc at 200M	N/A	.8
Pcat 500M	N/A	.5

Pd = Probability of Detection Pc = Probability of Characterization

NOTE: Threshold and objective parameters are based on operating conditions during the ACTD. Ranges for extreme geophysical or locations conditions will be adjusted according to additional testing and will be determined at a later date in the acquisition process.

4.1.3 (U) On-Board Processors. The common processor must provide the means to perform target finding, fixing, tracking, and identification (targeting) as described above and shall be capable of correlating sensor information from at least two on-board sensor modules ***(threshold) (objective—five)*** to provide increased target identification and locational accuracy. The processor must be capable of storing all the signatures necessary to identify at least 10 distinct targets ***(threshold) (objective—20)***. Additionally, the processor must be capable of tracking no less than five physically separated targets. Minimal separation will be a minimum of 100 meters at a distance of 200 meters from the individual ARGUS unit ***(threshold) (objective—separation and proximity to sensor TBD).*** Also it must be able to characterize and report the identification using an arbitrary confidence level scale of low/medium/high ***(threshold) (objective—scale of 1 to 10 with 1 being low)***. Any target definitions, geographic, or any other file that is likely to require periodic changes shall be a remote, user-editable parameter file.

4.1.4 (U) Communications Interface. The communications interface component of ARGUS must ensure two-way global communications between the ARGUS and its operator interface. Specifically, an AOI must be able to communicate with a deployed ARGUS unit, regardless of their respective locations, provided both are located anywhere on the globe between 65 degrees latitude north to 65 degrees latitude south. The intent is to ensure ARGUS is able to operationally support any form of distributed operations supporting a world-wide contingency ***(threshold/objective) (Key Performance Parameter)***. Any additional emergent requirements above 65 degrees north or below 65 degrees south will be added to the emerging SATCOM requirements database if they are validated. The ARGUS communications system must be easily interchangeable (modular in nature) to accommodate theater communications systems, and—as previously stated—capable of supporting two-way communications. An ARGUS unit must have the capability to produce sensor reports automatically (or upon request), through a designated satellite communications system, or via line-of-sight (LOS), to the ARGUS operator

interface (AOI). The AOI, described in paragraph 4.1.9 below, will then reformat the target report into a format compatible with the theater C4ISR architecture for dissemination via that architecture to the AOC and other authorized theater recipients (including NATO and Coalition as appropriate), as well as second echelon and national-level subscribers. The report(s) will be used in near real time (NRT) by battle managers to cue other ISR sensors; divert airborne alert aircraft for possible target prosecution; or incorporated into theater and national intelligence data bases for future applications use by battle managers or weapon systems. The communications system must support rapid dissemination of potential targeting opportunities to the appropriate C2 node and/or weapons systems using in-theater communications to ensure interoperability ***(threshold/objective)***. System and file formats must meet common industry standards (e.g., American Standard Code for Information Interchange [ASCII]) and must comply with applicable information technology standards contained in the DoD Joint Technical Architecture (JTA) ***(threshold/objective)***. ARGUS data reports must be compatible with MIL Standard 6040; meet the Joint Tactical Radio (JTR) standards as required by Assistant Secretary of Defense for Command Control Communications and Intelligence (ASD/C3I); and interface with the existing, in-theater Command, Control, Communications, and Computer Intelligence, Surveillance, and Reconnaissance (C4ISR) architecture ***(threshold/ objective) (Key Performance Parameter)***. Finally, since the communications module is the only emitting component of ARGUS it must be designed to LPI/LPD standards ***(threshold/objective)***. It is acknowledged that Special Operations Forces (SOF) have unique communication requirements based on their mission which may mandate different communications solutions for SOF specific missions.

4.1.4.1 **LPI/LPD Characteristics.** LPI/LPD Signals. Although threshold and objective parameters for LPI and LPD are yet TBD, the intent is to minimize exploitation by hostile forces. In order to minimize the probability of capture by an adversary through direction finding techniques and to reduce the risk of subsequent exploitation, the ARGUS must employ an LPI/LPD signal for its transmitter output. LPI/LPD signals are those which are difficult to identify as signals of interest and to geolocate their transmitters. LPI/LPD signals employ techniques to mask wave form features, hide in

the presence of noise, or other nearby known signals and minimize output transmit power and duration. An LPI/LPD radio provides protection against the detection and recognition of its signal, and the geolocation of its transmitter.

4.1.5 (U) Power Supply. The ARGUS modules must be designed to achieve minimum power consumption. The power supply must be designed to operate for at least 6 months based on an ARGUS configured with two sensor modules and 50 sense-analyze-report cycles per day ***(threshold) (objective—five sensors and 75 sense analyze report cycles per day)***. The power supply must last a correspondingly longer time should the alarm rate be less. The ARGUS unit must withstand power transient/drop outs with no detrimental long-term effects ***(threshold/objective)***. Power sources must not generate thermal, electromagnetic, and acoustic signatures that are detectable from greater than 100 meters ***(threshold) (objective--10)***. Additionally, provisions need to be made for the incorporation of an alternative power source such as solar power to extend the life of the ARGUS ***(objective)***.

4.1.6 (U) Other On-Board Equipment. The ARGUS must include systems such as a Global Positioning System (GPS) receiver and antenna, and an electronic compass to enable the sensor to determine its location, orientation, and operational status. The ARGUS has to incorporate a self-diagnostics system to determine and report on the operational status of the sensor following deployment ***(threshold/ objective).*** Locational accuracy shall be within 10 meters ***(threshold) (objective—3 meters)*** and orientation accuracy within 45 degrees ***(threshold) (objective—10 degrees)***. The self-locating device must incorporate a selective availability, anti-spoofing module (SAASM) ***(threshold/ objective)***. Finally, it must have a physical intrusion detection capability ***(threshold) (objective—countermeasures memory erase)***.

4.1.7 (U) Physical Criteria.

4.1.7.1 (U) Configuration. System modules must permit easy configuration within two distinct delivery chassis (hand emplaced and airdropped) and must allow an operator to select and employ any combination of its sensor sub-system or data transmission

components, as desired ***(threshold/objective)***. Sensors shall be modular in nature such that any given sensor can be easily removed and replaced with another in field conditions ***(threshold/objective)***. Existing modules must be software and hardware upgradeable to the extent possible and replaceable as necessary, thereby limiting the cost for chassis changes, platform integration, training, logistics support and testing ***(threshold/objective)***. Software must consist of interoperable "plug and play" modules designed to support specific sensor subsystem functionality and must be based on common software architecture enabling the selected modules to provide and receive information from a common processor ***(threshold/objective)***. This architecture must enable the maximum use of commercial off-the-shelf/government off-the-shelf (COTS/GOTS) hardware and software modules that conform to commercial and government standards ***(threshold/objective)***. The processing/display/utility software shall be compatible with existing user operating system standards ***(threshold/objective)***. Additional delivery chassis such as airdropped water-borne and air-dropped self-mobile may be needed as additional sensor types come on line.

4.1.7.2 (U) Size/Weight.

4.1.7.2.1 (U) Hand emplaced chassis. An entire operable hand emplaced ARGUS must fit entirely in a medium All-purpose, Lightweight, Individual Carrying Equipment (ALICE) package ***(threshold/objective)*** and weigh less than 30 pounds ***(threshold) (objective—500 cubic inches and 15 pounds)***. All separate components and small parts which detach or require assembly must be provided with an individual soft cases or bags to facilitate packing in the same medium ALICE pack as the ARGUS ***(threshold/objective)***.

4.1.7.2.2 (U) Airdrop. An entire operable airdrop ARGUS chassis must be sized and weight minimized to allow carriage on high performance jet aircraft, transport aircraft, helicopters, and UAVs ***(threshold/objective)***: Dimensions must be under 60 inches x 6 inches in diameter ***(threshold) (objective—40 inches x 4 inches in diameter)*** and weigh less than 100 pounds ***(threshold/objective).***

4.1.7.3 (U) Pre-Deployment Assembly. The maximum time for configuration of subsystems to meet mission and theater requirements is 60 minutes ***(threshold) (objective—30 minutes)***.

4.1.7.4 (U) Field Emplacement (hand emplaced chassis): The maximum time for setup, to include sensor emplacement, in the field is 15 minutes ***(threshold) (objective—5 minutes)***.

4.1.7.5 (U) Durability/Survivability. The hand emplaced and the airdropped ARGUS must survive in the same climatic conditions worldwide as the supported forces ***(threshold/objective)***. These include such conditions and environments as electronic countermeasures, smoke, aerosols, fog, rain, haze, dust, sand, wind, high humidity, snow, icing, biological, chemical, salt spray, swamp gas, hail etc. Additionally, the airdrop ARGUS must be able to survive external carriage on an aircraft prior to delivery and survive impacts with the ground. Specific parameters are outlined in paragraph 5.5.2. The hand emplaced ARGUS must be capable of withstanding a four-foot drop to a concrete surface with no detrimental effects on system operations. Although all versions should be water resistant, the hand emplaced ARGUS must be able to survive water immersion for at least 60 minutes ***(threshold) (objective—90 minutes)***.

4.1.8 (U) Mission Planning Tools. A mission planning software application, compatible with Theater Battle Management Core Systems (TBMCS) and Air Force Mission Support System (AFMSS)/Joint Mission Planning Systems (JMPS), and consisting of all the tools necessary to determine the proper location for sensor deployment is required ***(threshold/objective)***. As a minimum the application must include a terrain suitability tool, which consists of lines-of-communications (LOCs), cultural features, soil composition, and terrain masking factors ***(threshold/objective)***. It must also include ARGUS performance data and incorporate a target signature database ***(threshold/objective)***. The application must have appropriate interfaces to enable access to meteorological data, IPB data, geospatial information and services (GI&S) data, and

imagery ***(threshold/objective)***. Using this data and user provided objectives; the application must develop a sensor deployment array, including appropriate target signatures, optimized for the specific target set ***(threshold/ objective).*** The deployment array must take maximum advantage of terrain masking but not affect or interfere with the sensor performance or long-haul communications ***(threshold/objective)***.

4.1.9 (U) ARGUS Operator Interface (AOI). An AOI must be developed to provide the data and connectivity required to conduct sensor management functions such as monitoring the health of the deployed sensors, evaluating the sensor reports, and determining whether adjustments need to be made to the sensor's on-board files (signatures, reporting criteria, etc.) ***(threshold/ objective)***. The communications segment for the AOI must be modular and adaptable to any theater-specific communications architecture ***(threshold/ objective)***. The AOI must also be deployable and capable of monitoring the activities of at least 100 deployed sensors ***(threshold/objective)***. The AOI must be developed in a manners that is compatible, consistent, and interoperable with the Distributed Common Ground System (DCGS) in order to comply with guidance supplied in HQ USAF Vice Chief of Staff message dated 240232Z, April 2000 ***(threshold/objective)***. DCGS is an open architecture, multi-intelligence system designed to perform distributed tasking, processing, exploitation, and dissemination (TPED) operations. It gives the Joint Forces Air Component commander (JFACC) flexibility to provide forward theater and rear operational support while increasing quality and quantity of integrated actionable operational intelligence. In addition, the AOI must also be compatible with the JTA and meet the JTR standards as required by ASD/C3I to meet Joint interoperability requirements ***(threshold/objective)***.

4.1.10 (U) Pre-Deployment Programming and Testing Device. The pre-deployment programming and testing device must be capable of remote access and downloading of signature and configuration data from the mission planning tools application and programming the ARGUS ***(threshold/objective)***. It must also be able to remotely determine the health of the ARGUS and confirm that the ARGUS is configured properly ***(threshold/objective)***. The device must be hand-held and designed for immediate interface with the ARGUS to reduce the time required to program and test the ARGUS

prior to deployment ***(threshold/objective)***. The time required to program each ARGUS unit and confirm configuration will not exceed 1 minute ***(threshold) (objective—multiple sensors)***.

4.1.11 (U) Delivery Accuracy. The Circular Error of Probability (CEP) for the airdropped chassis must be no higher than 100 meters ***(threshold) (objective 10 meters)***.

4.2 (U) Logistics and Readiness.

4.2.1 (U) Logistics. The ARGUS maintenance concept will be limited to the storage and pre-deployment phase, and will be structured around two levels of maintenance, organizational and depot. The ARGUS equipment will be maintained using Line Replaceable Unit (LRU) replacement at the unit level ***(threshold/objective)***. It will include "on the spot" minor repair/module replacement with minimal tools. Built-in-test (BIT) and fault-isolation test (FIT) equipment must be able to identify and correctly isolate 95% of the critical faults down to the LRU level to permit spares to be readily installed in the field ***(threshold/objective)***. When activated, the ARGUS will perform a self-test and must notify the operator of its operational status ***(threshold/objective)***. Restoration of the system's mission essential functions must occur in less than 60 minutes ***(threshold/objective)***. Failed items will be returned to depot for repair.

4.2.2 (U) Readiness. The ARGUS must have a designated Mean Time Between Critical Failure (MTBCF). MTBCF is a measure of the average time between failures of mission-essential system functions. A critical failure is defined as any action that makes the system unable to initiate or perform its critical mission functions (critical mission functions are: find, identify, broadcast, and receive), and includes failures due to hardware, software, procedures, personnel, etc. A critical failure is a failure which prevents mission duration of 180 days as determined by the life of the battery. For purposes of mission reliability, MTBCF is defined as:

MTBCF = (number of operating hours) / (number of critical failures)

4.2.2.1 *ARGUS Operator Interface*. Must have a MTBCF of at least 4,180 hrs ***(threshold/objective)***.

4.2.2.2 *ARGUS Unit.* Must have a MTBCF of at least 4,032 hrs ***(threshold/objective).***

4.2.3 Operational Availability. The Operational Availability (Ao) throughout all mission scenarios, except for a nuclear environment, should be greater than 98.5%, where Ao is defined as the probability that ARGUS is operable and capable of initiating a specified mission at any random (unknown) time ***(threshold/objective)***. The LRU Mean Time to Repair (MTTR) for the ARGUS should be less than 1 hour ***(threshold/objective)***. MTTR is the measure of maintainability of the ARGUS and describes the period of time the system is not in condition to perform its functions due to the restoration actions as a result of critical failure. MTTR includes the total time to restore the system's mission essential functions, and includes such actions as software reboots, switch over, or active corrective maintenance with the appropriate administrative logistics delay time. The ARGUS equipment (with the specific exception of the systems' batteries) must be capable of being transported in an unclassified mode via military or commercial air, sea, and land transportation ***(threshold/objective)***.

4.3 (U) Other System Characteristics.

4.3.1 (U) Survivability. The ARGUS must be able to survive while operating in urban, forested, desert, jungle, maritime and arctic terrain and environments ***(threshold/ objective)***. The system must survive environmental conditions such as smoke, aerosols, fog, rain, haze, dust, wind, snow, icing, biological, chemical, etc ***(threshold/objective)***. The ARGUS must be water resistant. If inadvertently dropped in standing water, it must be capable of surviving up to one hour in a pool of water with no detrimental effects. This will be demonstrated via environmental qualification testing.

4.3.2 (U) Security. The ARGUS will operate at the UNCLASSIFIED level ***(threshold/objective)***. Once deployed ARGUS must have a feature with a remote disable capability ***(objective)***. That feature would be a means to erase the on-board signature library since it is the most sensitive part of the system. Measures must be incorporated to

reduce a potential adversary's ability to use captured ARGUS equipment as an information warfare tool by flooding the communications architecture receivers with false or misleading reports ***(objective)***. This feature must include a fail-safe device to prevent inadvertent or accidental initiation. The capability must also allow for remote reprogramming/reestablishment of all system operating features.

4.3.3 Electronic Protect. The ARGUS detection reports and system status reports must be designed and formatted to minimize the amount of data transmitted in order to reduce the possibility of electronic detection and exploitation ***(threshold/objective)***.

4.3.4 Radio Frequency Interference (RFI). The ARGUS must be resistant to RFI generated externally, and must not generate RFI harmful to the operator, all air delivery platforms, or capable of causing damage, disruption, or interference to other electrical devices/components on the delivery airdrop ARGUS on all air delivery platforms ***(threshold/objective)***.

4.3.5 Spectrum Certification. All DoD components must obtain National and International radio frequency support determination for all communications electronics (C-E) equipment or systems, including Commercially-Developed-Items (CDI), Commercial-Off-The-Shelf (COTS, and/or Non-Developed Items (NDI) subsystems ***(threshold/objective)***. This effort should begin as early as possible prior to system acquisition in order to synchronize the schedule impacts so that spectrum support for obtaining Continental United States (CONUS) frequency assignments (12-18 Months) or Outside CONUS (2-4 Years) frequency assignments does not become a certification liability. RF emitters will have RF/Sensor certification (DD Form 1494), Application for Equipment Frequency Allocation and valid RF/Sensor assignments prior to operational use ***(threshold/objective)***. Per DoD Directive 5000.2.R, spectrum supportability for a system must be determined prior to initialing cost estimates for development or procurement.

4.3.6 Information Assurance (IA). IA shall be an integral part of all system interoperability efforts thus allowing appropriate security measures to protect mission data and system resources from all known threats. The system must incorporate defensive IA capabilities that provide the availability, integrity, authentication, confidentiality, and non-repudiation of the information exchanged and used ***(threshold/objective)***. This includes characteristics needed for restoration through protection, detection and reaction capabilities. The system must comply with applicable DoD IA policies and regulations ***(threshold/objective)***. Interconnection of systems operating at different classification levels shall be accomplished by processes (e.g., Secret and Below Interoperability) that have been approved by the DOD Chief Information Officer (CIO) ***(threshold/objective)***. The system must be certified and accredited in accordance with DoDI 5200.40 and AFSSI 5024 ***(threshold/objective)***. Finally, the ARGUS system must include an open architecture design to maximize use of future sensor development ***(threshold/objective)***.

5.0 (U) Program Support. We recommend Joint Interest - Joint program management is inappropriate because of the traditional JFACC mission envisioned for the air dropped ARGUS. However, a strong potential for other Service use or systems interface exists.

5.1 (U) Maintenance Planning. The ARGUS will be maintained using a two-level maintenance concept consisting of organizational and depot maintenance ***(threshold/objective)***. Organizational maintenance and depot level maintenance will be supported primarily by contractor logistic support (CLS)—if a best value determination decision is made according to criteria outlined in the Source of Repair Assignment Process (SORAP) in AFI 21-102, Depot Maintenance Management. In order to maintain a low per unit cost for a short-life-cycle, one-time-deployable sensor, it is imperative that sensor support be effective and provide the essentials required to ensure operational readiness prior to deployment. The following are maintenance alternatives.

5.1.1 (U) Organizational Maintenance. Organizational maintenance consists of those equipment tasks normally performed using the resources of the operating command at the

operating location, whether in garrison or deployed. Organizational maintenance tasks include equipment cleaning, lubrication, corrosion prevention, performance of periodic inspections testing, troubleshooting, fault isolation to LRU, and removal and replacement of LRUs. Wire, cable, and/or connector repair, and replacement of minor hardware components such as batteries and other expendable line items are also performed at this level. Troubleshooting must be accomplished by using fault diagnostics procedures, and/or BIT. Spare LRUs for the electronic components will be kept available within the unit to allow immediate replacement. There must be no special test equipment or tools at the organizational level (***threshold/objective)***.

5.1.2 (U) Depot Level Maintenance. Depot level maintenance will be performed by designated contractors)—if a best value determination decision is made according to criteria outlined in the SORAP in AFI 21-102 Depot Maintenance Management—and will consist of all tasks required to maintain and repair the system beyond the scope of organizational maintenance capability. Depot level support will require additional cost to sensors over the life cycle. Depot repair requires initial purchase and support for test equipment plus continuous upgrades to maintain system capability to handle changing technology. Technical Orders (TO), additional depot level training, licensing issues and spares and test equipment purchases will also be cost drivers for system support. Since these sensors are "expendable," the logistic support costs for these systems should be minimal.

5.2 (U) Support Equipment. No unique tools will be required to maintain the ARGUS. An ARGUS specific pre-deployment programming and testing device will be required ***(threshold/objective)***. Sensor hardware and software are anticipated to be 90% COTS. The delivery vehicle will be Government Furnished Equipment (GFE) and delivered via a ballistics drop, by a variety of military aircraft using the BRU-46/47—or equivalent delivery systems—as an unguided munitions type. The sensor can be designed with adequate spare and growth capability in both sensor hardware, software and test/support equipment to enable long term support for future requirements. Use of existing COTS support technology will allow for lower system support costs and enable future COTS

support equipment to be used to support systems checkout and repair. Hands on training, operators manuals, automated tech manuals and computer aided training software can be made available to service leads that will use and maintain the sensors. These capabilities will be used to support current and future training and repair needs.

5.3 (U) Human Systems Integration (HSI).

5.3.1 (U) Manpower. With the exception of quality assurance evaluation (QAE) personnel no additional manpower will be required at the component or lower echelons to perform specific maintenance on the system other than that which will be performed by contractors. It is anticipated those contractors will also conduct pre-deployment programming and system tests of the ARGUS. Once deployed to a forward operating base (FOB), contractor support will maintain and verify inventory, conduct periodic inspections to ensure deployed assets are operationally available, and load new signatures into the sensors' data base prior to operation employment. The on-site contractor will also be responsible for providing training to active duty components on proper procedures for conducting sensor pre-flight checkout and loading procedures. It is anticipated that a back-shop Air Force Specialty Code (AFSC 2A3XX) will actually install the sensor tail can assembly onto the nose section of the drop body and conduct the BITs to ensure operational status prior to transportation to the flight line for loading on the drop aircraft. The specific flight line functions responsible for loading the sensors could be a Weapons, Avionics, or another similar active duty component as part of their daily mission responsibilities. Current Aerospace Operations Center (AOC) ISR personnel (1NXXX/14NXX) will accomplish ARGUS sensor planning tasks; interface with the ISR Team at the AOC for air tasking order (ATO) development; and, for the immediate future, provide the interface between the commercial satellite down link location and the dissemination injection point. The objective will be to automatically inject targets of high interest into the integrated broadcast service using Joint Forces Air Component Commander (JFACC), Joint Forces Maritime Component Commander (JFMCC), or Joint Forces Land Component Command (JFLCC) defined confidence

levels. Any targets not meeting those defined confidence levels could be sent to theater or national intelligence nodes for further action as necessary.

5.3.2. (U) Training. As part of the CLS, a training program will be established to train appropriate personnel in sensor tasking and operations as well as loading procedures for maintenance. The commands will ultimately be responsible for continuation training and on-the-job training (OJT) of all personnel assigned to employ ARGUS or use ARGUS data.

5.3.2.1 Operations Training. Operations training will be performed by Class I contractors and must be accomplished through the use of programmed texts, computer-based training, video instruction, Mobile Training Teams (MTT), and on-site training courses. Operations training will include mission planning, effective ARGUS employment techniques, and training AOC personnel on the effective use of ARGUS data. Training must consist of interactive tactical equipment training, creating a realistic simulated environment for use in garrison ***(threshold/objective)***. Proficiency training will include direct and complete simulation of the ARGUS resulting in highly realistic training media tailored to any operational environment and scenario.

5.3.2.2 Logistics Training. Since contractors will maintain most aspects of the ARGUS maintenance requirements, minimal maintenance training at a deployment should be required. Specific training will be provided by on-site contractor support to maintenance personnel on the correct procedures for conducting pre-flight tests (go/no-go); installing the tail can (with pre-installed sensors and signatures loads) onto the nose cone; and then sensor loading onto the bomb rack along with required aircraft configuration modifications.

5.3.3 (U) Human Factors Engineering. ARGUS must comply with the applicable industry standard Human Factors Engineering Program requirements and with the Human Factor Engineering Design requirements ***(threshold/objective)***. ARGUS must ensure use,

efficiency, and safety of operation in performance of all functions by operational and contract maintenance personnel ***(threshold/objective)***.

5.3.4 (U) System Safety and Health Hazards. Safety will be a prime consideration in any solution to these requirements. A system safety program will be tailored to the requirements of this program. The equipment must be as safe to operate and maintain as feasible, not present any environmental health hazards to personnel, and not produce unnecessary hazardous waste during use or disposal ***(threshold/objective)***, or all identified safety and health hazards will be clearly marked on equipment, described in the appropriate manual, and included in MTT training ***(threshold/objective)***.

5.3.5 (U) Human-Machine Interface. All fasteners, latches, switches, knobs and buttons must be able to be manipulated when the operator is wearing cold weather gloves, flight gloves, or chemical warfare gloves ***(threshold/objective)***. The human-machine interface devices must be small, lightweight, single-person transportable, night vision goggle and chemical warfare mask compatible, and readable in low and bright light ***(threshold/objective)***. ARGUS components which include external buttons, switches or knobs must be provided with locks, or other protection, to ensure selected settings are not interrupted due to shifting of equipment or adjacent cargo ***(threshold/objective)***.

5.4 (U) Computer Resources. All hardware and software developed or procured for the ARGUS shall be entirely owned by the government ***(threshold/objective***. The mission planning application will be compatible with TBMCS and AFMSS/JMPS compliant. One remote AOI will be required for every 100 ARGUS ***(threshold/objective)***.

5.5 (U) Other Logistics Considerations.

5.5.1 (U) Hand emplaced chassis. Size, weight, power requirements, and equipment setup times for the hand-emplaced chassis must be consistent with transportation, deployment, and operations in a special operations forces tactical environment. The

hand-emplaced system must also be able to be transported by one individual ***(threshold/objective)***. All system components need to be built into a chassis that provides integral shock/vibration protection during air, sea, and ground transportation ***(threshold/objective)***. The system must be sufficiently ruggedized to withstand deployment via man-pack parachute operations and withstand a four-foot drop to a concrete surface with no detrimental effects on system operations ***(threshold/objective)***. Packaging must provide for safe handling by one person ***(threshold/objective)***. When configured for transport, packaging must also protect the equipment from damage and degradation due to exposure to chemical elements (e.g., salt air or spray, fuel and engine exhaust) ***(threshold/objective)***. System design must minimize and simplify signal and power cabling requirements during installation ***(threshold/objective)***.

5.5.2 (U) Airdrop chassis. All system components need to be built into a chassis that provides integral shock/vibration protection during air, sea, and ground transportation. The system must be sufficiently ruggedized to withstand deployment from aircraft to include high performance jet aircraft, transport aircraft, helicopters and UAVs. For purposes of ORD, specifications for this ruggedness means the Tail Can must withstand a force of 2000 Gs for 5 milliseconds and 500 Gs for 240 milliseconds ***(threshold/ objective) (Key Performance Parameter)*** and the Nose Cone section must withstand 500 Gs for 240 milliseconds ***(threshold/objective).*** Packing and methods of preservation shall be those required to protect material against environmentally induced corrosion, physical and mechanical damage and other forms of degradation during storage, multiple handling and shipment associated with the military distribution system.

5.5.3 Provisioning Strategy (Supply Support). A spares management effort will be undertaken to control analysis, acquisition, delivery, documentation, and repair activities for all newly developed/designed items. Spares will be provisioned by designated support facility item managers for all newly developed/ designed items. The designated support facility is responsible for the prime equipment spares support for all newly developed/designed items on the ARGUS program. Provisioning data will be provided to the user components.

5.5.4 (U) Technical Data Requirements. Technical manuals and an engineering data Technical Data Package (TDP) suitable for military or contractor personnel on equipment maintenance, configuration control, sustainment, and engineering will be provided for systems. Organizational level technical manuals must be validated and available prior to Type I training and operational test and evaluation (OT&E). Following OT&E, if the technical manuals cover new technology that is not available in the commercial market place, a full set of technical documentation will be provided to the AF Information Warfare Center (AFIWC) for inclusion of the systems into the Electronic Warfare Integrated Reprogramming Database (EWIRD). Air Force Materiel Command (AFMC) will be responsible for uploading applicable information into the maintenance CAMS/REMIS or follow on IMDS.

5.5.4.1 Engineering Data. Engineering data are required for systems to define and document an engineering design or product configuration. Commercial items must be documented to the best commercial practices.

5.5.4.2 Technical Orders (TOs). Commercial manuals will be adopted in place of TOs. When possible, they should be in digital or soft-copy format. If necessary, more specific manuals will be developed by the contractor. Any supplements to commercial manuals will be accomplished prior to declaring an Initial Operational Capability (IOC). All manuals will be provided to the using organization prior to the system being turned over to AFMC.

5.5.5 (U) Shelters/Environmental Requirements. Although the ARGUS will require no unique shelter or environmental controls, it must be packaged with appropriate protection from the environment and compatible for transportation via air, land, sea, and rail ***(threshold/objective)***.

5.5.6 (U) Logistics Support Analysis (LSA)/Logistics Management Information (LMI). The goal is to institute a tailored LSA program for the ARGUS with the deliverables to be determined by the Integrated Logistics Support (ILS) manager coordinated through the ILS Management Team (ILSMT), and the designated ARGUS supply chain manager.

5.5.7 (U) Environment, Safety, and Health (ESH). ESH cost and risk drivers are important to the user community. Operations, Maintenance, Support and Disposal activities require a system with minimal hazardous materials (HAZMATs); minimal health risks; and minimal environmental safety life cycle costs. Any HAZMATs used as part of the system's Operations, Maintenance, Support and Disposal activities, must be identified and adequate procedures and equipment (to include engineering controls/ appropriate personal protective equipment) must be included with the delivered system. The components of ARGUS and their support will not present uncontrolled safety or environmental hazards throughout their life cycle. Health hazards will be eliminated, reduced to acceptable levels, or appropriate controls to minimize exposure IAW with all Occupational Safety and Health (OSH) Agency (OSHA) and AFOSH standards. If components of ARGUS use a radioactive source, the components will be delivered from the manufacturer with a current and valid Nuclear Regulatory Commission materials license with proper exemption per Title 10, Code of Federal Regulations, Part 30 ***(threshold/objective)***.

5.5.8 (U) Advanced Technology. System operators/maintainers will require minimal training to load new software and minor hardware upgrades in the field. Existing available tools (operator interface drives, on-hand equipment, etc.) will complete any necessary tasks.

5.5.9 (U) System Warranties and Guarantees. Specific system and assembly warranties must be considered for the system's software and hardware.

5.6 (U) Command, Control, Communications, Computers and Intelligence (C4I). ARGUS must be able to interface with DoD standard communications, to include landline, cellular, SATCOM and radio in order to effectively provide information to the warfighter. The "ARGUS C4I Support Plan (C4ISP)" (draft) 1 May 00, describes how the system will be integrated into the C4I architecture. It includes a system description, operational employment concept, C4I support requirements, and interoperability and connectivity characteristics. The system's operational concept and design takes into consideration both pre-deployment checkout at the FOB and deployed locations, and addresses battery life conservation requirements for FOB and deployed operations. Specific interface requirements are also graphically represented in the ARGUS Systems Interface Description (SV-1) at attachment 2 to this ORD.

5.6.1 Remote Connectivity/Reprogramming. In order to facilitate rapid reprogramming of the on-board ARGUS sensor(s), a robust database of target signatures must be created and maintained by the National Intelligence Centers (Air and Ground) for each sensor type. ***(Threshold/Objective)***. This database must be easily accessible by ARGUS tasking personnel for immediate reprogramming of the sensor if required ***(Threshold/Objective)***. In addition, a capability to easily update the target signatures with new information and targets must also be available ***(Threshold/Objective)***. All radio frequency transmitter system components must be US Military Communications-Electronics Board certified (DD Form 1494) and transmit on approved radio frequencies ***(Threshold/Objective)***. Host nation radio frequency assignments, when required, must be acquired before fielding the platform ***(Threshold/Objective).***

5.7 (U) Transportation and Basing. The majority of the ARGUS will be stored by the Air Combat Command (ACC), as the ARGUS operational manager, and maintained in mission ready condition by contractor support. As a force providing command, ACC will deploy ARGUS in support of Joint Operations. It is also likely that Air Force Special Operations Command (AFSOC) will store ARGUS to support United States Special Operations Command (USSOCOM) requirements, when and if their requirements for hand-emplaced ARGUS are submitted and validated.

5.8 (U) Standardization, Interoperability, and Commonality. The ARGUS must comprise non-developmental COTS and GOTS hardware and software to the maximum extent possible. Modularity at the lowest possible level will ensure a system comprising standardized, interoperable, common components that are easily upgradeable or replaced as necessary. A deployed ARGUS unit will primarily interface with an AOI via satellite communications. It is possible—although unlikely—line-of-sight communications could be employed. The ARGUS as a system must be interoperable with the existing in-theater C4ISR architecture. As a minimum, ARGUS must achieve interoperability by meeting those critical IER line items as listed in Appendix 2 (figure OV-3) to this ORD. (***Threshold) (Objective—all IER line items) (Key Performance Parameter)*** ARGUS data must also be available to Coalition or NATO C4I systems (e.g., RELROK LAN), via multi-level security functions such as RADIANT MERCURY ***(Threshold/Objective).*** ARGUS will comply with all standardized message text formats and be compatible with the JTA and meet the JTR standards as required by ASD/C3I. Because it is anticipated ARGUS reports will use United States Message Text Format (USMTF) standard formatted messages, the ARGUS system must undergo and receive interoperability certification—per MIL Standard 6040 and frequency allocation and approval ***(Threshold/Objective).***

5.9 (U) Mapping, Charting, and Geodesy Support. ARGUS will use National Imagery and Mapping Agency (NIMA) Geospatial Information and Services (GI&S) Foundation Data (FD) (e.g., Digital Point Positioning Data Base (DPPDB), ARC Digitized Raster Graphics (ADRG), ARC Digitized Raster Images (ADRI) Controlled Image Base (CIB), etc.). Geospatial Information and Services and imagery support will be critical in terrain characterization analysis to determine ARGUS deployment locations. This analysis will require terrain data (Digital Terrain Elevation Data [DTED] Level-2 or better), up-to-date lines of communications (roads, rail, waterway) data, detailed cultural features data, and soil condition data. Additionally, imagery of potential deployment locations will be required to ensure suitability.

5.10 (U) Environmental Support. Meteorological data (observed and forecast), including aviation and general purpose ordnance employment, will be required to support ARGUS air delivery. Atmospheric and space environmental data and forecasts will be required to predict long-haul communications reliability. All data must be TBMCS and AFMSS/JMPS compliant to ensure compatibility with the ARGUS mission planning application.

5.11 (U) Operational Support. The MASINT Acquisition Center will continue to support the ARGUS system after it is fielded, with continued block production deliveries, block upgrades (spiral development), sustaining engineering and system modifications to incorporate new technology to incorporate new missions and mission capability or improve system maintainability and reliability.

6.0 (U) Force Structure

6.1 (U) Air Force Required ARGUS Systems. Preliminary analysis estimates that the Air Force requires 2,500 ARGUS and sufficient spares to support two major regional contingencies and other contingencies as required. The force structure by chassis type will be determined through detailed analysis once Special Operations requirements are incorporated, although initially a 1:1:2 ratio for hand-emplaced, airdrop and airdrop will be used. Hand-emplaced ARGUS (600 total) organization of assignment will be determined after USSOCOM and AFSOC support capabilities are coordinated. 150 airdrop ARGUS are tentatively projected to be assigned to Pacific Air Forces (PACAF) and United States Air Forces, Europe (USAFE) each for immediate deployment in the event of operations. The remainder (1600) will be assigned to ACC forces and delivered as needed. A procurement rate of 150 ARGUS annually is expected as replenishment for ARGUS used in exercises and training. For real world/contingency operations, additional replenishment will be required to replace expended ARGUS units.

6.2 (U) Air Force Required ARGUS Support Equipment: Twenty-fiveAOIs and 25 programming and testing devices will be required (1 for every 100 ARGUS).

6.3 (U) Other Military Requirements for ARGUS. Potentially, any service could employ ARGUS but it is expected that the Air Force will be the primary force provider of this system. Current estimates of the quantity required by other services is no more than 1,000 with one AOI and 1 programming and testing device for every 100 ARGUS. The force structure by chassis type will be determined through detailed analysis but initially an even split by chassis type is estimated.

7.0 (U) Schedule Considerations. ARGUS fields a core capability with a modular system structure providing for future upgrades and changes. Initial Operational Capability (IOC) will be achieved upon fielding of ARGUS considering the threshold capabilities outlined in paragraph 4.0, and when 10% of the quantities determined in paragraph 6.0 have been delivered. Final Operational Capability (FOC) will be achieved when all components have been delivered to ACC in the quantities referred to in paragraph 6.0. New capabilities will be incrementally inserted as technology evolves. The evolutionary effort will continue adding increased capabilities, as they are developed to counter the threat.

8.0 (U) Affordability/Cost of Ownership. A requirement exists for a low cost system. The **Objective** average unit procurement price for the system is no more than $15,000 ***(Objective/ Threshold--$25,000)*** in FY 00 dollars, for 150 units initial ARGUS procurement).

Requirements Correlation Matrix - Part I
Advanced Remote Ground Unattended Sensors (ARGUS)

AS OF DATE: 1 Apr 00

System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
1. **General Requirements** (4.1.1.)		
1.1 ***Mission capability*** (4.1.1.)	Must be capable of finding, fixing, tracking (direction of travel), identifying (targeting) and reporting on designated target types	Same
1.2. ***Remoted operations*** (4.1.1.)	Must be unattended and contain the data collection, correlation, and transmission devices necessary to send information to remote locations using satellite or other theater transmission mediums	Same
1.3. ***Visual detectability*** (4.1.1.)	The ARGUS visual signature must be designed to incorporate camouflage techniques and be compatible with the geographical environment of the deployed area	Same
1.4. ***Battery life conservation*** (4.1.1.)	Sensors must be able to go into a standby mode for power conservation until activated by targets or remotely queried for system status.	Same.
1.5. ***Remote reprogramming*** (4.1.1.)	The user must have the ability to define and remotely add additional targets of interest to the system.	Same
1.6. ***Unattended operations*** (4.1.1.)	None	Units must collect and store unknown signatures for transmission when queried
2. **Sensors**		
2.1. ***Sensors Suite*** (Elements and Features) (4.1.2.)		
2.1.1. Sensor module types(4.1.2.)	Two	Five
2.1.2. Detect/identify range (4.1.2.) ***(Key performance parameter)***	Within 500/200 meters	2,000/500 meters
2.1.3. Effluent detection (4.1.2.)	None	Classify local environmental condition to predict potential NBC fallout and direction of travel
2.1.4. **Acoustic Sensor Characteristics (**4.1.2)		
2.1.4.1. Detection Range (4.1.2.)	500 meters	2,000 meters
2.1.4.2. Identification Range (4.1.2.)	200	500
2.1.4.3. Bearing (4.1.2.)	+/- 10 Degrees	+/- 2 Degrees
2.1.4.4. Direction of Travel (4.1.2.)	Within 45 degrees	Within 15 degrees
System Capabilities and Characteristics Parameters	**ORD I/II**	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
2.1.4.5. Pd at 500 meters (4.1.2.)	.95	.99
2.1.4.6. Pd at 1,000 meters (4.1.2.)	.9	.95

2.1.4.7. Pd at 2,000 meters (4.1.2)	N/A	.95
2.1.4.8. Pi at 200 meters (4.1.2.)	.95	.99
2.1.4.9. Pi at 500 meters (4.1.2.)	.6	.95
2.1.4.10 Pi at 1,000 meters (4.1.2.)	N/A	.7
2.1.5. ***Seismic Sensor Characteristics (4.1.2)***		
2.1.5.1. Detection Range (4.1.2.)	200M	500M
2.1.5.2. Identification Range (4.1.2.)	N/A	200M
2.1.5.3. Pd at 100 meters (4.1.2)	.95	.95
2.1.5.4. Pd at 200 meters (4.1.2)	.8	.9
2.1.5.5. Pd at 500 meters (4.1.2)	.5	.8
2.1.5.6. Pi at 100 meters (4.1.2)	N/A	.95
2.1.5.7. Pi at 200 meters (4.1.2)	N/A	.8
2.1.5.8. Pi at 500 meters (4.1.2)	N/A	.5
3. **On-Board Processors (4.1.3)**		
3.1. Minimum number of sensors for data correlation (4.1.3)	Two	Five
3.2. Number of stored signatures (4.1.3)	10	20
3.3. Simultaneous target tracking (4.1.3)	Five, minimum separation distance to be determined.	Same
3.4. Identification confidence (4.1.3)	Low/medium/high	Scale of 1 to 10 with 1 lowest.
4. **Communications Interface**		
4.1. Two-way communications. (4.1.4) ***(Key Performance Parameter)***	Must provide access for existing global, two-way (between 65° north to 65° south).	Same
4.2. Dissemination capability. (4.1.4)	The communications system must support rapid dissemination of potential targeting opportunities to the appropriate C2 node and/or weapons systems using in-theater communications to ensure interoperability.	Same
4.3. Data formats for information technology standards. (4.1.4)	System and file formats must meet common industry standards (e.g., American Standard Code for Information Interchange [ASCII]) and must comply with applicable information technology standards contained in the DoD Joint Technical Architecture (JTA).	Same

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System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
4.4. C4ISR Interoperability (4.1.4) ***(Key Performance Parameter)***	Data reports must be compatible with MIL Standard 6040; meet the Joint Tactical Radio (JTR) standards as required by Assistant Secretary of Defense for Command Control Communications and Intelligence (ASD/C3I); and interface with the existing, in-theater Command, Control, Communications, and Computer Intelligence, Surveillance, and Reconnaissance (C4ISR) architecture.	Same
4.5. Communications characteristics (4.1.4)	LPI/LPD	Same
5. **Power Supply**		
5.1. Duration (4.1.5)	Six months with two sensor modules and 50 sense-analyze-report cycles per day	Six months with five sensor modules and 75 sense-analyze-report cycles per day.
5.2. Battery characteristics (4.1.5)	Standard military battery and withstand power transient/drop outs with not detrimental effects.	Same
5.3. Power sources' emanations (4.1.5)	Must not provide thermal, electromagnetic, and acoustic signatures that are detectable from greater than 100 meters.	Same
5.4. Alternative power sources	None	Solar or other TBD advancements in battery technologies.
6. ***Other On-Board Equipment*** (4.1.6)		
6.1. System status (4.1.6)	Must incorporate a self-diagnostics system to determine and report on the operational status of the sensor following deployment	Same
6.2. System self locate (4.1.6)	Within 10 meters	3 meters
6.3. Orientation (4.1.6)	Within 45 degrees	10 degrees
6.4. Anti-spoofing module (4.1.6)	The self-locating device must incorporate a selective availability, anti-spoofing module (SAASM)	Same
6.5. Physical intrusion detection (4.1.6)	Detect and report	Detect, report, and erase memory
7 ***Physical Criteria*** (Elements and Features) (4.1.7.)		
7.1. ***Configuration*** (4.1.7.1)		

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System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
7.1.1. Overall configuration (4.1.7.1)	System modules must permit easy configuration within three distinct delivery chassis (hand emplaced, airdrop – hard impact, and airdrop – soft impact) and must allow an operator to select and employ any combination of its sensor sub-system or data transmission components, as desired.	Same
7.1.2. Modularity (4.1.7.1)	Must be modular in nature so any given sensor can be removed and replaced with another in field conditions.	Same
7.1.3. Upgradeable (4.1.7.1)	Existing modules must be software and hardware upgradeable to the extent possible and replaceable as necessary, thereby limiting the cost for chassis changes, platform integration, training, logistics support and testing	Same
7.1.4. Software interoperabililty (4.1.7.1)	Software must consist of interoperable "plug and play" modules designed to support specific sensor subsystem functionality and must be based on common software architecture enabling the selected modules to provide and receive information from a common processor.	Same
7.1.5. Software supportability (4.1.7.1)	Must enable the maximum use of commercial off-the-shelf/government off-the-shelf (COTS/GOTS) hardware and software modules that conform to commercial and government standards.	Same
7.1.6. Compatibility (4.1.7.1)	The processing/display/utility software shall be compatible with existing user operating system standards.	Same
7.2. ***Size/weight*** (4.1.7.2)		
7.2.1. Hand emplaced (4.1.7.2.1)		
7.2.1.1. Portability (4.1.7.2.1)	All separate components and small parts which detach or require assembly must be provided with an individual soft cases or bags to facilitate packing in the same medium ALICE pack as the ARGUS	Same
7.2.1.2. Weight (4.1.7.2.1.)	Less than 30 pounds	15 pounds
7.2.1.3. Size (4.1.7.2.1)	Fit entirely into an ALICE package	500 cubic inches or less.
7.2.2. Airdropped (4.1.7.2.2)		

System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
7.2.2.1. Aircraft portability (4.1.7.2.2)	Must be sized and weight minimized to allow carriage on high performance jet aircraft, transport aircraft, helicopters, and UAVs	Same
7.2.2.2. Dimensions (4.1.7.2.2)	60 inches in length by 6 inches diameter	40 inches by 4 inches
7.2.2.3. Weight (4.1.7.2.2)	Less than 100 pounds	Same
7.3. ***Pre-deployment assembly*** (4.1.7.3)		
7.3.1. Subsystem configuration/assembly	60 minutes	30 minutes
7.4. ***Field emplacement*** (4.1.7.4)		
7.4.1. Hand emplacement in the field	Maximum 15 minutes	Five minutes
7.5. ***Durability/survivability*** (4.1.7.5)		
7.5.1. Climatic conditions (4.1.7.5)	The hand emplaced and the airdropped ARGUS must survive in the same climatic conditions worldwide as the supported forces.	Same
7.5.2. Water resistance (4.1.7.5)	Although all versions should be water resistant, the hand emplaced ARGUS must be able to survive water immersion for at least 60 minutes.	90 minutes
7.6. ***Mission Planning Tools*** (4.1.8)		
7.6.1. Compatible with Theater Mission Planning functions (4.1.8)	Must include mission planning software application, compatible with Theater Battle Management Core Systems (TBMCS) and Air Force Mission Support System (AFMSS)/Joint Mission Planning Systems (JMPS), and consisting of all the tools necessary to determine the proper location for sensor deployment.	Same
7.6.2. Terrain suitability (4.1.8)	Must include a terrain suitability tool, which consists of lines-of-communications (LOCs), cultural features, soil composition, and terrain masking factors.	Same
7.6.3. Database (4.1.8)	It must also include ARGUS performance data and incorporate a target signature database.	Same
7.6.4. Theater interfaces (4.1.8)	Must have appropriate interfaces to enable access to meteorological data, IPB data, geospatial information and services (GI&S), and imagery.	Same
7.6.5. Deployment options (4.1.8)	Must develop a sensor deployment array, including appropriate target signatures, optimized for the specific target set.	Same

System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
7.6.6. Terrain characteristics (4.1.8)	Must take the maximum advantage of terrain masking but not affect or interfere with the sensor performance or long haul.	Same
7.7. ***ARGUS Operator Interface*** (4.1.9)		
7.7.1. General (4.1.9)	Must be developed to provide the data and connectivity required to conduct sensor management functions such as monitoring the health of the deployed sensors, evaluating the sensor reports, and determining whether adjustments need to be made to the sensor's on-board files (signatures, reporting criteria, etc.)	Same
7.7.2. AOI communications segment	The communications segment for the AOI must be modular and adaptable to any theater-specific communications architecture.	Same.
7.7.3. Deployability (4.1.9)	Must be deployable and capable of monitoring the activities of at least 100 deployed sensors.	Same
7.7.4. Monitoring (4.1.9)	Must be capable of monitoring the activities of at least 100 deployed sensors.	Same
7.7.5. Theater interfaces (4.1.9)	Must be modular and adaptable to any theater-specific communications architecture.	Same
7.7.6. DCGS compatibility (4.1.9)	The AOI must be developed in a manners that is compatible, consistent, and interoperable with the Distributed Common Ground System (DCGS) in order to comply with guidance supplied in HQ USAF Vice Chief of Staff message dated 240232Z, April 2000	Same
7.7.7. Joint interoperability (4.1.9)	Must also be compatible with the Joint Tactical Architecture (JTA) and meet the Joint Tactical Radio (JTR) standards as required by Assistant Secretary of Defense (ASD/C3I) to meet Joint interoperability requirements.	Same
7.8. ***Pre-deployment Programming and Testing Device*** (4.1.10)		
7.8.1. Remote operations (4.1.10)	Must be capable of remote access and downloading of signature and configuration data from the mission planning tools application and programming the ARGUS.	Same

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System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
SYSTEM PERFORMANCE		
7.8.2. Operational status (4.1.10)	Must also be able to remotely determine the health of the ARGUS and confirm that the ARGUS is configured properly.	Same
7.8.3. Portability (4.1.10)	Must be hand-held and designed for immediate interface with the ARGUS to reduce the time required to program and test the ARGUS prior to deployment.	Same
7.8.4. Pre-deployment programming time requirements (4.1.10)	Time required to program each ARGUS and confirm configuration will not exceed 1 minute	Simultaneously program multiple sensors.
7.9. ***Delivery Accuracy***		
7.9.1. Air-dropped CEP (4.1.11)	CEP of 100 meters or less	10 meters

LOGISTICS AND READINESS		
8. **Logistics** (4.2.1.)		
8.1. Equipment maintenance (4.2.1)	Equipment will be maintained using LRU replacement at the unit level.	Same
8.2. Mission component failure identification (4.2.1)	Built-in-test (BIT) and fault-isolation test (FIT) equipment must be able to identify and correctly isolate 95% of the critical faults down to the LRU level to permit spares to be readily installed in the field	Same
8.3. Self test capabilities (4.2.1)	Will perform a self-test and must notify the operator of its operational status when activated.	Same
8.4. Mission restoration time (4.2.1)	Restoration of the system's mission essential functions must occur in less than 60 minutes	Same
9. **Readiness** (4.2.2)		
9.1. MTBCF – Operator interface (4.2.3)	Must have a MTBCF of at least 4,180 hrs	Same
9.2. MTBCF – Operator unit (4.2.3)	Must have a MTBCF of at least 4,032 hrs	
9.3. Operational Availability (4.2.3)	The Operational Availability (Ao) throughout all mission scenarios, except for a nuclear environment, should be greater than 98.5%,	Same
9.4. Mean Time to Repair (4.2.3)	LRU Mean Time to Repair (MTTR) should be less than 1 hour	Same
9.5. Transportation requirements (4.2.2)	Must be capable of being transported in an unclassified mode via military or commercial air, sea, and land transportation.	Same

System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
OTHER SYSTEM CHARACTERISTICS		
10. **Survivability** (4.3.1)		
10.1. ***Operating environment*** (4.3.1)	Must operate in urban, forested, desert, jungle, maritime and arctic terrain and environments.	Same
10.2. ***Environmental conditions*** (4.3.1)	Must survive environmental conditions such as smoke, aerosols, fog, rain, haze, dust, wind, snow, icing, biological, chemical, etc.	Same
11. **Security** (4.3.2)		
11.1. ***Security level of operations*** (4.3.2)	Unclassified	Same
11.2. ***Deployed self-protection*** (4.3.2)	Same	Must have a self-destruct feature and a remote disable capability
11.3. ***IW countermeasures*** (4.3.2)	Same	Measures must be incorporated to reduce a potential adversary's ability to use captured ARGUS equipment as an information warfare tool by flooding the communications architecture receivers with false or misleading reports.
12. **Electronic protect** (4.3.3)		
12.1. ***System reports*** (4.3.3.)	Detection reports and system status reports must be designed and formatted to minimize the amount of data transmitted in order to reduce the possibility of electronic detection and exploitation.	Same
13. ***RFI*** (4.3.4)		
13.1. ***General*** (4.3.4)	Must be resistant to RFI generated externally, and must not generate RFI harmful to the operator, all air delivery platforms, or capable of causing damage, disruption, or interference to other electrical devices/components including delivering airdrop ARGUS on all air delivery platforms.	Same
14. **Spectrum certification (4.3.5)**		
14.1. Radio Frequency support (4.3.5)	Must obtain National and International radio frequency support determination for all communications electronics (C-E) equipment or systems, including Commercially-Developed-Items (CDI), Commercial -Off-The-Shelf (COTS, and/or Non-Developed Items (NDI) subsystems	Same

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System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
14.2. RF/sensor frequency certification (4.3.5)	RF emitters will have RF/Sensor certification (DD Form 1494), Application for Equipment Frequency Allocation and valid RF/Sensor assignments prior to operational use**.**	Same
15. **Information Assurance** (4.3.5)		
15.1. ***Defensive capabilities*** (4.3.5)	Must incorporate defensive IA capabilities that provide the availability, integrity, authentication, confidentiality, and non-repudiation of the information exchanged and used	Same
15.2. ***DoD IA policies compliance*** (4.3.5)	Must comply with applicable DOD IA policies and regulations	Same
15.3. ***Interconnection approval*** (4.3.5)	Interconnection of systems operating at different classification levels shall be accomplished by processes that have been approved by the DOD CIO.	Same
15.4. ***System certification*** (4.3.5)	System must be certified and accredited in accordance with DoDI 5200.40 and AFSSI 5024.	Same
15.5. ***Open-architecture Design*** (4.3.5)	Systems must have open – architecture design to maximize use of future sensor development.	Same
16. **Maintenance Planning** (5.1.)		
16.1. ***Maintenance Concept*** (5.1)	Must be maintained using a two-level maintenance concept.	Same
16.2. ***Special equipment*** (5.1.1)	There must be no special test equipment or tools at the organizational level	Same
16.3 **Support Equipment** (5.2.)		
16.3.1. ***Pre-deployment preparations*** (5.2)	An ARGUS specific pre-deployment programming and testing device is required.	Same
17. **Human Systems Integration** (5.3)		
17.1. **Training**		
17.1.1. ***Operational Training*** (5.3.2.1)	Must consist of interactive tactical equipment training to create a realistic simulated environment for use in garrison.	Same
17.2. **Human Factors Engineering** (5.3.3)		

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System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
17.2.1. ***Oversight compliance*** (5.3.3)	Must comply with the applicable industry standard Human Factors Engineering Program requirements and with the Human Factor Engineering Design requirements.	Same
17.2.2. ***General factors*** (5.3.3)	Must ensure use, efficiency, and safety of operation in performance of all functions by operational and contract maintenance personnel.	Same
17.3. **System Safety and Health Hazards** (5.3.4)		
17.3.1. ***Operating and maintenance safety*** (5.3.4)	Must be safe to operate and maintain, not present any health hazards to personnel, and not produce unnecessary hazardous waste during use or disposal.	Same
17.3.2. ***Safety markings*** (5.3.4)	All identified safety and health hazards will be clearly marked on equipment, described in the appropriate manual, and included in MTT training.	Same
17.4. **Human Machine Interface** (5.3.5)		
17.4.1. ***Manipulation with gloves*** (5.3.5)	All fasteners, latches, switches, knobs and buttons must be able to be manipulated when the operator is wearing cold weather gloves, flight gloves, or chemical warfare gloves.	Same
17.4.2. ***Interfaces*** (5.3.5)	Must be small, lightweight,single-person portable, night visions goggle and chemical warfare mask compatible, and readable in low and bright light.	Small
17.4.3. ***Inadvertent settings disruptions*** (5.3.5)	Components which include external buttons, switches or knobs must be provided with locks, or other protection, to ensure selected settings are not interrupted due to shifting of equipment or adjacent cargo**.**	Same
18. **Computer Resources** (5.4)		
18.1. ***Ownership*** (5.4)	All hardware and software developed or procured for the ARGUS shall be entirely owned by the government.	Same
18.2. ***Monitoring stations*** (5.4)	One operator work station will be required for every 100 ARGUS	Same
19. **Other Logistics Considerations** (5.5)		
19.1. **Hand emplaced chasis** (5.5.1)		
19.1.1. ***Special operations considerations*** (5.5.1)	Must be able to be transported by one individual.	Same

System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
19.1.2. ***System components*** (5.5.1)	All must be built into chassis to provide integral shock/vibration protection during air, sea, and ground transportation.	Same
19.1.3. ***Ruggedness*** (5.5.1)	Must be sufficiently ruggedized to withstand deployment via manpack, parachute operations and must withstand four-foot drop to a concrete surface with no detrimental effects on system operations	Same
19.1.4. ***Packaging*** (5.5.1)	Must provide for safe handling by one person.	Same
19.1.5. ***Transportation packaging*** (5.5.1)	Must protect the equipment from damage and degradation due to exposure to chemical elements.	Same
19.1.6. ***Design simplicity*** (5.5.1)	Must minimize and simplify signal and power cabling requirements during installation.	Same
19.2. **Airdrop** (5.5.2)		
19.2.1. ***Tailcan ruggedness*** (5.5.2)	Must endure a force of 2,000 Gs for 5 milliseconds and 500 Gs for 240 milliseconds.	Same
19.2.2. ***Nose cone ruggedness*** (5.5.2)	Must survive external carriage on an aircraft prior to delivery.	Same
19.3. ***Shelters/Environmental Requirements*** (5.5.5)		
19.3.1. ***Packaging*** (5.5.5)	Must be packaged with appropriate protection from the environment and compatible for transportation via air.	Same
19.4. ***Environment, Safety, and Health*** (5.5.7)		
19.4.1. ***Radioactive controls***	If components of ARGUS use a radioactive source, the components will be delivered from the manufacturer with a current and valid Nuclear Regulatory Commission materials license with proper exemption per Title 10, Code of Federal Regulations, Part 30.	Same
20. **C4I** (5.6)		
20.1. ***Rapid reprogramming*** (5.6)	In order to facilitate rapid reprogramming of the on-board ARGUS sensor(s), a robust database of target signatures must be created and maintained by the National Intelligence Centers (Air and Ground) for each sensor type.	Same

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System Capabilities and Characteristics Parameters	ORD I/II	
	Thresholds	**Objectives**
20.2. ***Accessibility for programming and reprogramming*** (5.6)	Must be easily accessible by ARGUS tasking personnel for immediate reprogramming of the sensor and a capability for easily updating the target signatures with new information and targets must also be available.	Same
20.3. ***System transmitter certification*** (5.6)	All radio frequency transmitter system components must be US Military Communications-Electronics Board certified (DD Form 1494) and transmit on approved radio frequencies.	Same
20.4. ***Host nation rules*** (5.6)	Host nation radio frequency assignments, when required, must be acquired before fielding the platform	Same
21. **Standardization, Interoperability, and Commonality.** (5.8)		
21.1. **Interoperability Certification** (5.8) ***(Key Performance Parameter)***	ARGUS must achieve interoperability by meeting those critical IER line items as listed in Appendix 2 (figure OV-3) to this ORD. .	Meet all IER line items.
21.2. NATO/Coalition connectivity (5.8)	Must be available to Coalition or NATO C4I systems (e.g., RELROK LAN), via multi-level security functions such as RADIANT MERCURY	Same
22. **Affordability/Cost of Ownership** (8.0)		
22.1 ***Cost per unit***	Average unit procurement price of no more than $25,000 per unit for 150 units of initial procurement..	An average unit procurement price of no more than $15,000.

2

REQUIREMENTS CORRELATION MATRIX
PART II
Advanced Remote Ground Unattended Sensors (ARGUS)

(Supporting Rationale for System Characteristics and Capabilities)

AS OF DATE: 2 Apr 00
SYSTEM PERFORMANCE

EMPLOYMENT
1.1. Mission Capability. System must be able to perform its primary mission.

1.2. Remoted Operations. Recent military-technical developments point toward an increase in the depth of the battlespace. The integration of reconnaissance and precision guided munitions into extended battlespace operations emphasize the need for information deep into the battlespace without an on-site human observer. Mission Needs Statements such as Theater Missile Defense AF 004-91 and TMD MNS, JROCM –064-91, Lethal Suppression of Enemy Air Defenses (SEAD) (CAF329- 92) support this need. These remote sensors could also support NBC operations in data denied or enemy territories as noted in the USAF (CAF) 003-96 Joint Warning and Reporting Network (draft). Data dissemination from ARGUS sensors will provide additional ground truth data points.

1.3. Visual detectability. Due to long term and covert nature or operations, system must be low profile, difficult to see and detect in order to maintain ability to conduct mission without disruption. Mission success depends on the unobtrusiveness of the deployed sensor. Environmental adaptability is a must.

1.4. Battery life conservation. Power conservations methods are essential in order to achieve a 6-month mission duration. A long-term battery life capability is required but minimal power usage us essential for operational capability for the duration of a deployment.

1.5. Remote reprogramming, 1.6. unattended operations. . Automated sensors must have a capability to be remotely controlled from an operator interface or another ISR platform to access and view data and information, including operational status and system diagnostics. Since sensors will be located away from human resources, the remote capability is a must.

SENSORS
2.1.1. Sensor module types. Different mission tasking will require different capabilities. IOC will require only seismic and acoustic but for FOC, other capabilities will be necessary to provide the full spectrum of ARGUS capabilities.

2.1.2. Detect/identify range. ACTD evaluations demonstrated airdrop placement of the sensor could achieve a 100-meter accuracy. The need to emplace the sensor at least 200 meters from a roadway to avoid visual detection makes this requirement mission critical. Although the airdrop accuracy was in a permissive environment, a threat environment could possibly result in an increased drop radius, increased ballistic drop confidence factors should make this achievable.

2.1.3. Effluent detection. A future capability requirement to counter current and emerging threats to forces in the field.

2.1.4.1. Acoustic: Detection Range; 2.1.4.2. Identification Range; 2.1.4.3 Bearing; 2.1.4.4. Direction of Travel; 2.1.4.5. Pd at 500 meters; 2.1.4.6. Pd at 1,000 meters; 2.1.4.7. Pd at 2,000 meters; 2.1.4.8. Pi at 200 meters; 2.1.4.9. Pi at 500 meters; 2.1.4.10. Pi at 1,000 meters; 2.1.5.1. Seismic: Detection Range; 2.1.5.2. Seismic Identification Range; 2.1.5.3. Pd at 100 meters; 2.1.5.4. Pd at 200 meters; 2.1.5.5. Pd at 500 meters; 2.1.5.6. Pi at 100 meters; 2.1.5.7. Pi at 200 meters; 2.1.5.8. Pi at 500 meters. Sensor parameters are derived from a combination of technical availability, reliance on a minimum of two different sensors for higher confidence at lower probabilities of detection and classification and an informed military judgment as to minimum acceptable levels. These Probabilities are similar to those listed in Joint Capstone Requirements Document for the Family of Unattended Sensors, although adjusted for sensor technical availability. **However, it is extremely important to realize that these parametric probabilities are based on conditions existing and established during the ACTD.**

ON-BOARD PROCESSORS.
3.1. Minimum number of sensors for data correlation. Processing of two different sensors simultaneously is necessary to achieve a minimal level of confidence in the accuracy of the data as demonstrated during the UGS ACTD.

Number of targets tracked and stored is based on established table of organization and equipment (TO&E) for various target sets and informed military judgement as to likely movement patterns of this equipment.
3.2. Number of stored signatures. Based on potential number of individual class of TCTs and their individual threat signatures, it is realistic to expect the minimum number listed to be active during contingencies at any given time. JFACC options must not be limited by a reduced number of potential target sets.
3.3. Simultaneous target tracking. Normal TCT operations will require the ability to prosecute not only the TEL but support vehicles or additional threats as they support the primary threat target.
3.4. Identification confidence. Confidence levels will determine specific AO prosecution options.

COMMUNICATIONS INTERFACE.
4.1. Two-way communications. Remote, unattended, and long term contingency operations mandate that requirements to reprogram the deployed sensors. Without this capability, long term operations and planning becomes a problematic issues. As threat scenarios and attack operations options fluctuate, reprogramming becomes even more critical to mission flexibility.
4.2. Dissemination capability. TCT requirements mandate in-theater connectivity.
4.3. Data format and interoperability. Required by CJSI 3170.01A and CJCSI 6212.01B.
4.4. C4ISR interoperability. Mission requirements and ASD/C3I mandate interoperability.
4.5. Communications characteristics. LPI/LPD required to maintain the covert aspects of its mission.

POWER SUPPLY
5.1. Power supply duration. Mission requirements and sensor CONOPS requires extended mission duration to cover possible extended contingencies. Internal power supply required to allow the sensors to operate autonomously. Duration of power supply required to support long-term monitoring and to minimize risk during insertion. 180 days is the requirement considering balancing insertion risk, desire for long time-monitoring and probability the sensor will be detected and or tampered with within a specified time frame.
5.2 Battery characteristics. Mission requirements, maintenance flexibility and long duration taskings require assurance of continuous operations with standard issue materiel.
5.3. Power sources' emanations. Covert nature of the sensor requires it be as undetectable as possible.
5.4. Alternative power sources. For future long term operations.

OTHER ON-BOARD EQUIPMENT.
6.1. System status. Based on the unattended nature of the ARGUS, it is essential to verify the operational status of the deployed sensor without physically laying hands on the sensor. Operational readiness is contingent upon sensor health and well being.
6.2. System self locate. A critical component of mission accomplishment is to provide locating data to cross reference target to sensor location in order to cue other ISR assets for possible prosecution.
6.3. Orientation. Sensor effectiveness can be impacted by orientation of the sensor to the LOC. Knowing the orientation will help ascertain sensor effectiveness.
6.4. Anti-spoofing module. Required for new programs per CJCSI direction.
6.5. Physical intrusion detection. Remote operations, sensitive aspect of the onboard library and unattended operations with its inherent inability to physically monitor sensors require alert notifications to the AOI if unauthorized tampering occurs.
PHYSICAL CRITERIA
7.1.1. Overall configuration. Mission flexibility and responsiveness depends on the ability to configure the sensor according to the potential threat and target area.
7.1.2. Modularity. Requirement is essential to quick modifications prior to employment within the constraints of the ATO cycle.
7.1.3. Upgradeable. Required in order to enhance future capabilities to meet emerging threats and/or technologies.
7.1.4. Software interoperabililty, 7.1.5. Software supportability, 7.1.6. Compatibility Capability required to C4ISR interoperability across the spectrum. Additionally, intent is to minimize Vanishing Vendor Items which will limit future upgrade potential and restrict employment options against state of the art targets.
7.2.1.1. Portability, 7.2.1.2., Weight, 7.2.1.3. Size. Requirements based on ACTD results to support SOF and other employment options.
7.2.2.1. Aircraft portability, 7.2.2.2. Dimensions, 7.2.2.3. Weight. Requirements based on BRU 46/47 bomb racks, the standard for high performance aircraft in the CAF.
7.3.1. Subsystem configuration/assembly. Requirement derived from similar functions for weapons loading.
7.4.1. Hand emplacement in the field. SOF applications require expedient and covert delivery options. Specific figure determined to minimize risk to employing forces.
7.5.1. Climate conditions. Survivability factors must equal those of employing forces as a minimum.
7.5.2 Water resistant. Requirement based on hand emplacement obstacles and requirements for covert emplacement in case of evasion requirements during ingress.

7.6.1. Compatible with Theater Mission Planning functions 7.6.2.Terrain suitability, 7.6.3. Database, 7.6.4. Theater interfaces, 7.6.5. Deployment options, 7.6.6. Terrain characteristics. Based on interoperability requirements in CJSI 3170.01A and Air Force-wide mission planning tools. ARGUS should not require the use of geospatial information format transformation. The Air Force Functional Manager for Geospatial Information and Services (GI&S) Requirements (497IG/INOT) in a 20 Mar 98 Memo which stated "Air Force systems requiring GI&S support must be designed to use standard National Imagery and Mapping Agency (NIMA) products that do not require transformation." Data standards and specifications produced by NIMA will reduce the need for the use of proprietary software. If required, geospatial products will be used without preprocessing to the greatest extent possible. GI&S support is required when deploying remote, unmanned systems. US forces need accurate topographical data to be able to select the best locations. This information must include terrain and foliage data so these systems would not be dropped in inhospitable areas where they would be of no value. It is essential for deployed systems to have a GPS capability for location purposes.

7.7.1. Operator interfacegeneral. Long term mission management options will allow tasking agency flexibility in adjusting mission to emerging threats or the re-orient target nominations.

7.7.2. Communications interface, 7.7.5. Required for theater tasking and basic functionality of the system.

7.7.3. Deployability. To properly support AEF operations, the management function must be able to be located as directed by the theater tasking agencies.

7.7.4. Monitoring. Multi-tasking and monitoring functions are required for proper asset coordination. Specific number was determined by the ACTD to be the appropriate level to maintain situational awareness.

7.7.6. DCGS Compatibility. Required by CJCSI 3170.01A and AF/CV direction.

7.7.7. Joint interoperability. Required by DOD Dir 5000.2R and CJCSI 6212.01B.

7.8. Pre-deployment Programming and Testing Device. Essential to verify sensor status prior to employment to ensure operational status.

7.8.1. Remote operations. Program designed to support Attack Operations against TMD. Remote operations required to monitor inaccessible areas.

7.8.2. Operational status. To maintain awareness mission status and operational availability.

7.8.3. Portability. Designed for back bench testing purposes for maintenance support personnel. l

7.8.4. Pre-deployment programming time requirements. Driven by timelines for ATO development and manpower limitations.

7.9.1. Air-dropped CEP. Sensor capability dependant on proximity to lines of communications. Future smart sensor guidance will tighten the requirements.

LOGISTICS AND READINESS

8.1. Equipment maintenance. 8.2. Mission component failure identification. 8.3. Self test capabilities. 8.4. Mission restoration time. To support critical DoD missions, the new systems must operate on a 24-hour per day basis. Since deployable systems may be used as first-in assets, systems must be operable in the deployed environment up to 180 days in order to support wartime/contingency operations. Detection systems must be supported by organizational and depot level maintenance. ARGUS will be as easy to administratively and logistically support as available, allowing AOC operators and flightline maintenance and contractor personnel to perform their primary jobs vs. system housekeeping and troubleshooting/maintenance activities. System failures will not be repaired locally but shipped to the depot for repair.

9.1. MTBCF AOI, 9.2. MTBCF ARGUS unit, 9.3. Operational Availability, 9.4. Mean Time to Repair. TBM requirements mandate responsiveness and reliability over the period of the contingency. Quick reaction in order to meet timeliness requirements is essential to assets operating in support of the mission area.

9.5. Transportation. Deployment ease mandates all transportation modes possible.

SURVIVABILITY

10.1. Operating environment, 10.2. Environmental conditions. All deployable interior/exterior equipment must be able to function within planned environmental constraints for worldwide operations. These requirements are inferred from

SECURITY

11.1. Security level of operations, 11.2. Deployed self-protection, 11.3. IW countermeasures. ARGUS systems must meet minimum security requirements for AIS connectivity to Theater intelligence dissemination systems to ensure continued system certifications. Requirements are outlined in Agile Combat Support Threat Environment Description, NAIC-1574-0664-99, Feb 99; and Information Warfare Threats to Automated Information Systems Threat Environment Description, NAIC-1574-0210-97, Apr 97; AFPD 31-4, Information Security, 1 Sep 98; and AFPD 10-11, Operations Security, 17 May 93.

ELECTRONIC PROTECT

12.1. System reports. To meet warfighter information requirements, ARGUS must be able to automatically distribute, display, and store data in compatible formats. This requirement is consistent with JP 3-01.5 intent to consolidate the operational elements of TMD.

13. RFI. The impact of the electronic environment upon the operational capability of military forces, equipment, systems, and platforms encompasses all electromagnetic disciplines, including electromagnetic compatibility and electromagnetic interference; electromagnetic vulnerability; electromagnetic pulse; electronic protection (formerly electronic counter-countermeasures), hazards of electromagnetic radiation to personnel, ordnance, and volatile materials; and natural phenomena effects of lightning and p-static. All electric or electronic systems shall be designed to be mutually compatible with other electric or electronic equipment within their expected operational environment. Systems and equipment that emit or receive hertzian waves shall comply with OMB Circular A-11 to determine spectrum supportability prior to initiating cost estimates for development or procurement.

14.1. Spectrum Certification, radio frequency support. Per DoDD 5000.2.R spectrum supportability for a system must be determined prior to initialing cost estimates for development or procurement.
14.2. RF/sensor frequency certification. Electronic Environmental Effects (E3). In accordance with the DoD E3 program, managers must ensure the proposed system(s) are electromagnetically compatible within itself and with other systems in its operational environment. The operational performance of acquired systems should not be degraded by E3 nor degrade other DoD systems.

INFORMATION ASSURANCE

15.1. Defensive capabilities 15.2. DoD IA policies compliance, 15.3. Interconnection approval, 15.4. System certification, 15.5. Open-architecture Design. AFI 33-108 (Compatibility, Interoperability, and Integration Of Command, Control, Communications, and Computer (C4) Systems) establishes guidance and responsibilities to ensure compatibility, interoperability, and integration for new and modified command, control, communications, computer and intelligence (C4I) systems, including automated information systems (AIS). Interoperability ensures Air Force C4I systems work with other Air Force, DoD, and Allied systems without creating interference or interface problems. Interoperability can prevent duplicate and nonstandard C4 system development by identifying those mission needs having similar C4 requirements or which existing C4 systems can meet considering mission deficiencies, required functionality, and security requirements. The Joint Technical Architecture (JTA) applies to all C4I systems and the interfaces of other key assets (e.g., weapons systems, sensors, office automations systems, etc.) with C4I systems. The JTA also applies to C4I Advanced Concept Technology Demonstrations and other activities that lead directly to the fielding of operational C4I capabilities. The Defense Information Infrastructure (DII) Common Operating Environment (COE) will make maximum use of Commercial and Non-developmental Item (CaNDI). The evaluation process associated with inclusion of CaNDI products should either minimize interoperability issues or identify up-front the costs associated with achieving interoperability based on inclusion of a particular product. Interoperability of C4I Systems shall be in compliance with DoDD 4630.5, DoDI 4630.8, and CJCSI 6212.01A.

MAINTENANCE PLANNING

16.1. Maintenance Concept, 16.2. Special equipment. In order to stay within anticipated end-strengths, operation and maintenance of observing systems must not increase current manpower authorizations. Therefore, additional manpower requirements must not be a factor but rather use CLS support to ensure existing authorizations are trained to conduct system operations and support.
16.3.1 Pre-deployment preparations. Required to verify mission readiness prior to employment.
HSI
17.1.1 Operational training. Mission readiness requirements.
SAFETY
17.2.1. Oversight compliance, 15.2.2. General factors. To remain compliant with OSHA requirements and AF safety instructions.
17.3.1. Operating and maintenance safety, 17.3.2. Safety markings, 17.4.1. Manipulation with gloves , 17.4.2. Interfaces, 17.4.3. Inadvertent settings disruptions. Prior to deployment or employment, remote sensors must be configurable by personnel in full NBC gear in order to support mission requirements in threat environments identified by Agile Combat Support Threat Environment Description, NAIC-1574-0664-99, Feb 99; and Information Warfare Threats to Automated Information Systems Threat Environment Description, NAIC-1574-0210-97, Apr 97

COMPUTER

18.1. Ownership, 18.2. Monitoring stations. Automated sensors must have a capability to be remotely controlled from an operator interface or other PC/workstation through a dial-up capability and to access and view data and information, including operational status and system diagnostics. Since sensors will be located away from human resources, the remote capability is a must.

OTHER LOGISTICS CONSIDERATIONS

19.1.1. Special operations considerations, 19.1.2. System components, 19.1.3. Ruggedness, 19.1.4. Packaging, 19.1.5. Transportation packaging, 19.1.6. Design simplicity, 19.2.1. Tailcan ruggedness, 19.2.1. Nose cone ruggedness, 19.3.1. Survivable Packaging, 19.4.1. Radioactive controls. All deployable interior/exterior equipment must be able to function within planned environmental constraints for worldwide operations. They must be readily responsive to emerging requirements on short notice and must be capable of withstanding deployment and storage requirements for short and long term contingency operations.

C4I

20.1. Rapid reprogramming, 20.2. Accessibility for programming and reprogramming, 20.3. System transmitter certification, 20.4. Host nation rules. Requirement is based on AFI 10-707 (Spectrum Interference Resolution Program). AFI 33-118 (Radio Frequency Spectrum Management) identifies responsibilities for management of the radio frequency (RF) spectrum and provides procedures for implementing its use. Regulatory requirements specify that systems and equipment shall comply with applicable national and international spectrum management policies and regulations. The requirements for spectrum certification and supportability are necessary for compliance with DoD 5000.2-R, Part 4.4.7. The DoD spectrum certification process is mandatory for CaNDI applications. The lack of system spectrum certification would prevent the ARGUS from legally operating thereby resulting in operational limitations. All DoD components shall obtain spectrum utilization guidance from the Military Communications-Electronics Board (MCEB) in accordance with DoDD 4650.1. Requirements for foreign spectrum support shall be forwarded to the MCEB for coordination with host nations where deployment of the system or equipment is planned. The impact on other users of the RF spectrum by equipment that radiates RF energy must be minimized.

21.1. Interoperability Certification, 21.2. NATO/coalition connectivity. AFI 33-108 (Compatibility, Interoperability, and Integration Of Command, Control, Communications, and Computer (C4) Systems) establishes guidance and responsibilities to ensure compatibility, interoperability, and integration for new and modifies command, control, communications, computer and intelligence (C4I) systems, including automated information systems (AIS). Interoperability ensures Air Force C4I systems work with other Air Force, DoD, and Allied systems without creating interference or interface problems. Interoperability can prevent duplicate and nonstandard C4 system development by identifying those mission needs having similar C4 requirements or which existing C4 systems can meet considering mission deficiencies, required functionality, and security requirements. The Joint Technical Architecture (JTA) applies to all C4I systems and the interfaces of other key assets (e.g., weapons systems, sensors, office automations systems, etc.) with C4I systems. The JTA also applies to C4I Advanced Concept Technology Demonstrations and other activities that lead directly to the fielding of operational C4I capabilities. The Defense Information Infrastructure (DII) Common Operating Environment (COE) will make maximum use of Commercial and Non-developmental Item (CaNDI). The evaluation process associated with inclusion of CaNDI products should either minimize interoperability issues or identify up-front the costs associated with achieving interoperability based on inclusion of a particular product. Interoperability of C4I Systems shall be in compliance with DoDD 4630.5, DoDI 4630.8, and CJCSI 6212.01A.

AFFORDABILITY

20.1 Cost per unit. Threshold cost per unit was determined as a result of initial calculations during the evaluation of alternatives for the ACTD. Objective cost is consistent with diminished operating budgets and required numbers to be expended during contingencies.

ACROYNYM LIST

AC2ISRC	Aerospace Command and Control, Intelligence, Surveillance, and Reconnaissance Center
ACTD	Advanced Concept Technology Demonstration
AFMSS	Air Force Mission Support System
AFSOC	Air Force Special Operations Command
ALICE	All Purpose Lightweight Carrying Equipment
Ao	Operational Availability
AOC	Aerospace Operations Center
AOI	ARGUS Operator Interface
ARGUS	Advanced Remote Ground-Based Sensor
ASD	Assistant Secretary of Defense
AS&C	Advanced Systems and Concepts
ATO	Air Tasking Order
AWACS	Aerospace Warning and Control System
BIT	Built-In Test
C2	Command and Control
C2ISR	Command and Control Intelligence, Surveillance and Reconnaissance
C3I	Command, Control, Communications, and Intelligence
C4ISP	Command, Control, Communications, Computers and Intelligence Support Plan
CAF	Combat Air Forces
CAMS	Core Automated Maintenance System
CaNDI	Commercial and Non-developmental Item
CEP	Circular Error of Probability
CINC	Commander in Chief
CIO	Chief Information Officer
CLS	Contractor Logistics Support
COTS	Commercial-off-the-shelf
DEA	Drug Enforcement Agency
DIA	Defense Intelligence Agency
DTED	Digital Terrain Elevation Data
DUSD	Deputy Undersecretary of Defense
EA	Electronic Attack
EAF	Expeditionary Air Forces
EO	Electro-optical
FBI	Federal Bureau of Investigation
FIT	Fault Isolation Test
FOC	Final Operational Capability
F2T2	Find, Fix, Track and Target
GI&S	Geospatial information and services
GOTS	Government-off-the-shelf
GPS	Global Positioning System
HSI	Hyperspectral Imagery

IA	Information Assurance
IBS	Integrated Broadcast Service
ILS	Integrated Logistics Support
ILSMT	Integrated Logistics Support Management Team
ILSP	Integrated Logistics Support Plan
IMDS	Integrated Maintenance Data System
IOC	Initial Operational Capability
IPB	Intelligence Preparation of the Battlespace
IR	Infrared
IREMBASS	Improved Remote Battlefield Sensor System
ISR	Intelligence, Surveillance and Reconnaissance
IW	Information Warfare
JFC	Joint Forces Commander
JFACC	Joint Forces Air Component Commander
JIPTL	Joint Integrated Prioritized Targets List
JMPS	Joint Mission Planning System
JTA	Joint Technical Architecture
JTR	Joint Tactical Radio
KPP	Key Performance Parameter
LOC	Lines-of-communication
LOS	Line of sight
LPD	Low Probability of Detection
LPI	Low Probability of Intercept
LRU	Line Replaceable Unit
MASINT	Measurement and Signature Intelligence
MNS	Mission Needs Statement
MR	Mission Reliability
MTBCF	Mean Time Between Critical Failure
MTT	Mobile Training Teams
MTTR	Mean Time to Repair
NAIC	National Air Intelligence Center
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and Chemical
NGIC	National Ground Intelligence Center
NIMA	National Imagery and Mapping Agency
NRT	Near real time
OCA	Offensive Counter Air
OJT	On the Job Training
ORD	Operational Requirements Document
OT&E	Operational Test and Evaluation
OUSDAT	Office of the Undersecretary of Defense, Acquisition and Technology
PACAF	Pacific Air Forces
PMI	Preventive Maintenance Inspection
REMIS	Reliability and Maintainability Information System
RF	Radio Frequency

RFI	Radio Frequency Interference
SATCOM	Satellite Communications
SOF	Special Operations Forces
STAR	System Threat Assessment Report
TADIL	Tactical Digital Information Link
TBD	To be determined
TBMCS	Theater Battle Management Core System
TCT	Time-Critical Target
TED	Threat Environment Description
TM	Theater Missile
TO	Technical Order
TPED	Tasking, Processing, Exploitation, and Dissemination
UAV	Unmanned Aerial Vehicle
UGS	Unattended Ground Sensor
UMS	Unattended MASINT Sensor
USAF	United States Air Force
USAFE	United States Air Forces in Europe
USMTF	United States Message Text Format
USSOCOM	United States Special Operations Command
WMD	Weapons of Mass Destruction

REFERENCES

CJCSI 3170.01A, Requirements Generation System
CJCSI 6212.01A, Compatibility, Interoperability, And Integration Of Command, Control, Communications, Computers, And Intelligence Systems
DoDD 4630.5, Compatibility, Interoperability, Integration Of Command, Control, Communications, And Intelligence Systems (C3I)
DoDI 4630.8, Procedures for Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence (C3I) Systems
DoDD 4650.1, Management and Use of the Radio Frequency Spectrum
DoD 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information Systems
DoDI 5200.40
DoD 5200.8, Security Requirements for Automated Information Systems
DoDD 8320.1, Data Administration
Title 10, Code of Federal Regulations, Part 30
AFDD 1, Air Force Basic Doctrine
AFDD 1-1, Air Force Task List
AFPD 10-11, Operations Security
AFI 10-232, Year 2000 (Y2K) Continuity of Operations
AFI 10-707, Spectrum Interference Resolution Program
AFI 11-202, VOL 3, General Flight Rules
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AFPD 21-3, Technical Orders
AFI 21-102, Depot Maintenance Management
AFI 24-201 Cargo Movement
AFPD 31-4, Information Security
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AFI 33-108, Compatibility, Interoperability, and Integration of Command, Control, Communications, and Computer (C4) Systems
AFI 33-118, Radio Frequency Spectrum Management
AFI 33-202, Air Force Computer Security Program
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1998-B Theater Air and Missile Defense (TAMD) Master Plan (U), Chapter 3 & Annexes H1 through H-4, JTAMD0, Dec 98. (S/NF)
Ballistic Missile Reference Document, Theater Systems (U), MSIC, (S/NF)
"Operational Threat Environment, Major Regional Contingency -- Southwest Asia (SWA) (U)"
1998 Intelligence, Surveillance, and Reconnaissance Mission Area Plan (S)

Information Exchange Requirement Matrix

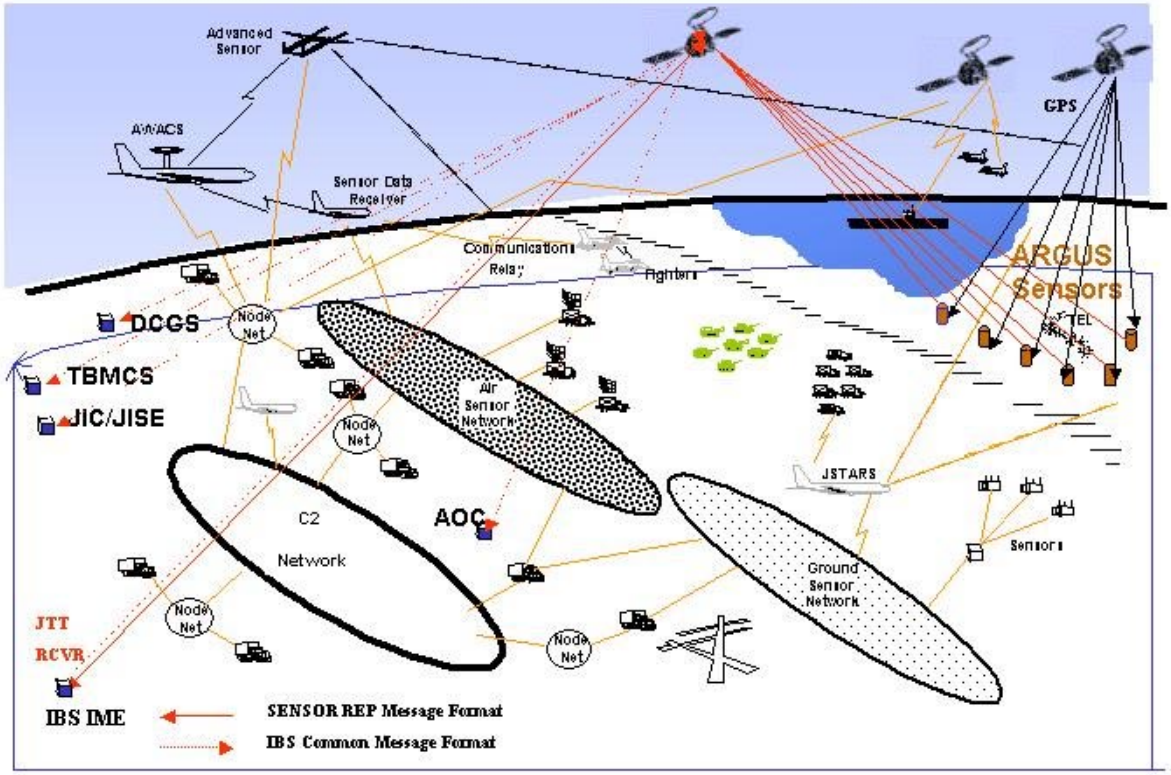
NL #	UJTL Number	Event	Info Characteristics	Sending Node	Receiving Node	Critical	Format	Timeliness (in Seconds)	Class	Remarks
1a	TBD	Initial Sensor Status Report Upon Emplacement:	Situational Awareness	ARGUS	AOI	Yes	Data	<60	Unclas	Sensor id, time, location, orientation and status report
1b	TBD	Daily Sensor Status Report	Situational Awareness	ARGUS	AOI	No	Data	<300	Unclas	Sensor id, time, Platform Positional and State of Health Data
1c	TBD	Contact Report as Required	Targeting	ARGUS	AOI	Yes	Data	<60	Unclas	Sensor id, time, Vehicle ID and / surveillance information
1d	TBD	Hourly History Report	Situational Awareness	ARGUS	AOI	No	Data	<360	Unclas	Contact summary
1e	TBD	Undetermined Signature	Situational Awareness	ARGUS	AOI	Yes		<120	FOUO	Sensor id, time, unknown feature vector
2a	TBD	Periodic Sensor Status Query	Command and Control	AOI	ARGUS	Yes	Data	<120	Unclas	Request for Sensor Status Report
2b	TBD	Periodic Sensor Command	Command and Control	AOI	ARGUS	Yes	Data	<300	FOUO	Command to change established settings
2c	TBD	Periodic Signature / Program Update	Command and Control	AOI	ARGUS	Yes	Data	<300	FOUO	Reprogram sensors with new signatures and/or processing instructions
3	TBD	Periodic Contact Report	Situational Awareness	AOI	DCGS	Yes	Data	<60	Class	Vehicle ID and / surveillance information
4	TBD	Periodic Contact Report	Targeting	AOI	TIBS/IBS	Yes	Data	<60	Class	Vehicle ID and / surveillance information
5	TBD	Periodic Contact Report	Targeting	AOI	TBMCS	Yes	Data	<60	Class	Vehicle ID and / surveillance information
6a	TBD	Initial Emplacement Sensor Status Report	Situational Awareness	AOI	JIC/JISE	Yes	Data	<60	Class	Sensor id, time, location, orientation and status report
6b	TBD	Daily Sensor Status Report	Situational Awareness	AOI	JIC/JISE	Yes	Data	<60	Unclas	Sensor id, time, Platform Positional and State of Health Data
6c	TBD	Periodic Contact Report	Situational Awareness	AOI	JIC/JISE	Yes	Data	<60	Unclas	Sensor id, time, Vehicle ID and / surveillance information

Attachment 1

NL #	UJTL Number	Event	Info Characteristics	Sending Node	Receiving Node	Critical	Format	Timeliness (in Seconds)	Class	Remarks
6d	TBD	Hourly History Report	Situational Awareness	AOI	JIC/JISE	No	Data	<300	Unclass	Contact summary
6e	TBD	Periodic Signature Report	Situational Awareness	AOI	JIC/JISE	Yes		TBD	FOUO	Sensor id, time, unknown feature vector
7a	TBD	Initial Sensor Emplacement Status Report	Situational Awareness	AOI	Reachback Center	Yes	Data	<60	Unclass	Sensor id, time, location, orientation and status report
7b	TBD	Daily Sensor Status Report	Situational Awareness	AOI	Reachback Center	Yes	Data	<300	Unclass	Sensor id, time, Platform Positional and State of Health Data
7c	TBD	Periodic Contact Report	Targeting	AOI	Reachback Center	Yes	Data	<60	Unclass	Sensor id, time, Vehicle ID and / surveillance information
7d	TBD	Hourly History Report	Situational Awareness	AOI	Reachback Center	No	Data	<300	FOUO	Contact summary
7e	TBD	Periodic Signature Update	Situational Awareness	AOI	Reachback Center	Yes	Data	<300	FOUO	Sensor id, time, unknown feature vector
8	TBD	ATO Sensor Tasking Order	Command and Control	CINC	JFC	Yes	Data	TBD	Secret	Deploy Sensor in support of Operations
9	TBD	ATO Sensor Tasking Order	Command and Control	JFC	JFACC	Yes	Data	<300	Secret	Deploy Sensors in support of Operations
10	TBD	Periodic Sensor Tasking Order	Command and Control	JFC	JIC / JISE	Yes	Data	<300	Secret	Determine sensor deployment locations
11	TBD	Periodic Sensor Emplacement Plan	Command and Control	JIC / JISE	JFACC	Yes	Data	<300	Secret	Sensor location and configuration data
12	TBD	Periodic Air Task Order	Command and Control	JFACC	FOB	Yes	Data	<300	Secret	Tasking to FOB
13	TBD	Periodic Sensor Status Checkout	Command and Control	Test Unit	ARGUS Sensor	Yes	Data	<60	Unclas	Sensor Operational?
14	TBD	Load-out Feature Vector/Operational Parameter Upload	Command and Control	Test Unit	ARGUS Sensor	No	Data	<60	Unclas	Mission Ready
15	TBD	Sensor Checkout	Command and Control	ARGUS Sensor	Test Unit	No	Data	<60	Unclas	Pass/Fail
16	TBD	Location report	Situational Awareness	GPS	ARGUS Sensor	Yes	Data	<60	Unclas	Sensor locating data

ARGUS

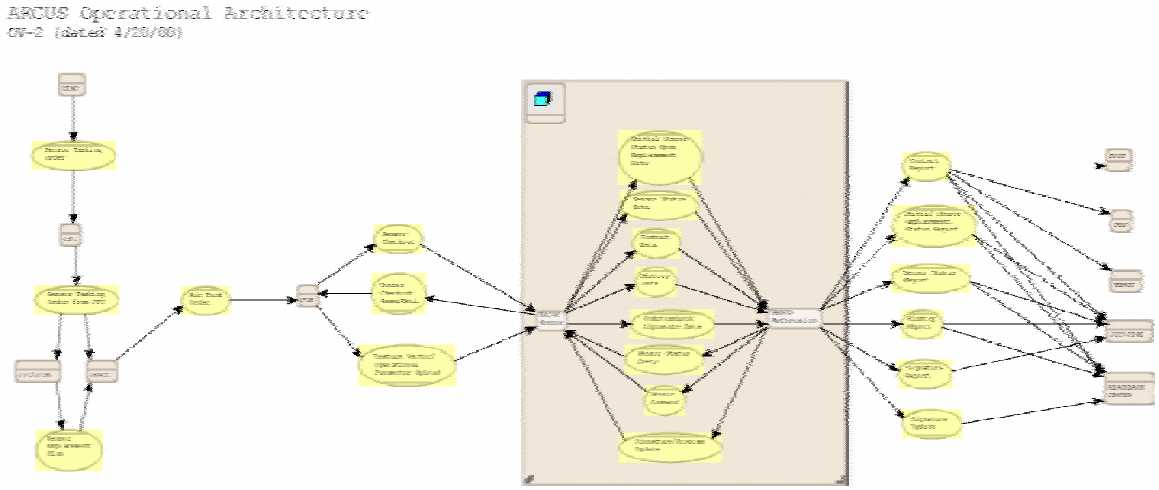
Operational Concept Graphic/System Interface Description



Attachment 2

ARGUS OV-2

Operational Architecture



Attachment 3